CHEMICAL INDUSTRIES

The Chemical Business Magazine

Aristocracy or Proletariat

UNWITTINGLY we chemical people have revolutionized the old economy of coal and iron, replacing it by the new economy of alloys and plastics and all sorts of synthetics. The economic foundation of an industrial technique based upon chemical reactions is quite different from one founded upon machine fabrication. Obsolescence is faster; depreciation, greater; the pace of progress, swifter; so that there must be new conceptions of capital investment and a quite new mental attitude towards processes and products, towards production and profits, towards research and reserves.

Obviously this widens the demand for chemicals; but as plainly it also creates new demands for chemically trained men. Places of responsibility and rare opportunity are being made in many fields for competent chemists and chemical engineers; but revolutions have a disconcerting way of purging the original band of revolutionists.

None will deny that in an epoch of industry conditioned by chemical technique, the chemical technologist is the ideal business leader. But none can affirm that our supply of chemically trained executives begins to meet even our own industry's demand for men of this type. Indeed, it is only too well known that the combination of competency in chemistry and executive capacity is rarely found.

Whether this results from the native incompatibility of these distinct talents or from the training which our technical men receive, is a moot, but important question. The first class, scientifically trained brain finds extreme difficulty in coming to a decision based upon incomplete data, and certainly the businessman must often act quickly and finally with many vital facts unknown and often quite unknowable. On the other hand, the burden, particularly of laboratory work, placed on the young chemist in college usually bars him from those campus activities which in his formative years are the undergraduate's best training in human relationships. These are considerations for our chemical educators to ponder.

Either they must attract to their courses young men blessed with the commercial instinct and endowed with capacities for industrial leadership or else they must kindle that instinct and develop those capabilities in the type of student they are training. If they fail us, we shall miss in the coming generation the glorious opportunity to furnish industrial America with a real chemical leadership.

We urge young technologists to take a lively interest in applied chemical economics. Beware of the mental snobbery of science. Do not disdain business. Learn what a chemically conditioned industry means. Remember that John Teeple warned you that a chemical man who does not know the cost and source of every raw material and the price and use of every finished product, will never be anything more than a laboratory chambermaid in industry.

Williams Haynes, Publisher and Editor; A. M. Corbet, and W. J. Murphy, Associate Editors; W. F. George, Advertising Manager; D. O. Haynes, Subscription Manager; J. H. Burt, Production Manager.

Saw Wood and Say Nothing

This is the season of the soothsayers who review the past and preview the future. We do it ourselves in this issue; but having done so and digested realms of surveys and prophecies from fellow prognosticators, we have come to the conclusion that it all sums up to this——

Business will be better during the coming twelve months if——

And we have collected thirty-seven distinct "ifs," the vast majority of which are such things as "war in Europe," over which we of the chemical industry have not the remotest control.

So let us go on in 1939 as we did in 1938, developing new products, perfecting new processes, building new plants, selling new customers, making what profits we can, confident that come good times or bad, chemical progress marches on!

There's so little we can do about so many things, yet so many things to be done that we can do and do well that this seems a most excellent year for us to saw wood and say nothing.

The Secretary of Commerce

From every angle of the business-point-of-view the appointment of Harry Hopkins as Secretary of Commerce is a blunder. As we go to press there is still doubt whether or not he will be confirmed by the Senate; but even should American business so be spared the direct results of the President's inept choice, it is itself a very serious discouragement.

In the first place the "promotion" smells of the most evil stench of politics. Not only has Mr. Hopkins' administration of the P.W.A. failed to impress the country with that efficiency and economy so conspicuously needed in any public works program; but it has also been criticized for the filtration of communistic, socialistic, and political influences utterly at variance with what the American people want unemployment relief to be. Mr. Hopkins demanded, and quite properly received, a free hand in his control of this enormously responsible task. To remove him while he is the target of serious criticism is clever; but it again reveals the President as a leader who is willing to be loyal to a faithful henchman at variance with his duty to the nation.

Secondly, Mr. Hopkins is signally unfitted either to restore the confidence or to enlist the cooperation of the American business community. Admittedly these are not among the multitudinous objectives of the New Deal. However, their own carefully planned and lavishly executed plans for recovery having failed to materialize in six years, the people are beginning to question their omnipotence. Even after the plain warning of the last election, the President again turns his back upon an opportunity to effect a rapprochement with the nation's business forces.

Finally, Mr. Hopkins' stoutly held and freely discussed theories of politico-economics are almost diametrically opposite to those entertained by the overwhelming majority of our business leaders, big and little, so that his appointment to that Department, avowedly organized to serve business interests, is too brutal to be excused as a clumsy mis-choice. In contrast to the prejudiced activities of Miss Perkins for Labor and Wallace for Agriculture, Harry Hopkins in Commerce seems an open affront to every manufacturer and merchant in the land.

Unemployment Responsibilities

Accordingly Mr. Hopkins' opening activity, a drive to have industry solve the nation's unemployment problem, is almost an insult to injury. Positive figures are certainly not available, but obviously there has been very little decrease in unemployment since the Roosevelt administration went into power with loud promises that this would be the first problem solved. Also, it is evident that industry has contributed less pro rata to the unemployment problem than has agriculture, or retail trade, or the so-called personal service group.

But such a drive upon the manufacturers of the country is absurd, chiefly because industrial unemployment in this country is the result to a very great extent of the very same New Deal policies which Mr. Hopkins has so vigorously supported. The Wagner Act, the taxes that discourage expansion, pump priming, the unbalanced budget, and a whole flock of measures designed to curtail supply, raise wages, hold up prices, are today the taproots of this very great and very serious evil. The whole philosophy of boot-strap lifting, to which Mr. Hopkins is devoted, is directly and effectively opposed to the normal industrial development of the country and the natural absorption of our present surplus labor through a healthy revival of demand.

New Products Distinguish the Year

What 1938 Meant to our Chemical World

THREE entirely new synthetic fibres—du Pont's nylon, Carbide's "Vinyon," Eastman's cellulose triacetate—have come to the commercial stage during 1938. With other new products and processes they give a real distinction to what has been in the main a hum-drum, discouraging twelvemonth to the American chemical industry.

Substantial progress has been made. But consumption has failed to keep the promises of last Spring; and while there has been a gradual improvement since the calamitous fourth quarter of 1937, profits have been below those of that year.

As usual our chemical companies have generally fared better than other major industrial groups, and pocketing our disappointments, we have pulled in the belt, gone on with a $200,000,000 building program, perfected several important new processes, marketed a number of likely new products, and in general endeavored to clamber over the stumbling blocks in the way of our normal chemical development.

The greatest of these continue to be of political rather than of technical or of economic origin. Therefore, the most substantial encouragement of the year came from the November election's promise of a return to a two party government. Epitomizing the political influences of the year past:

Direct effects of the tariff treaties have been almost invariably hurtful, but less so than their rather serious harm to such important chemical-consumers as American leather, glass, pottery, and textiles.

Taxation as recently conceived puts terrific burdens on an industry in the wholesome habit of paying for its expansions out of surplus.

Phosphorus, now available in pure elemental form and comparatively cheap, should be the basis of important chemical developments which are checked by the senseless hullabaloo about conservation and Government operation of western deposits.

Much done in the name of social security has engendered industrial insecurity, and lack of confidence is inspired by the Government's financial policies and the uncertain effects of much of the year's new legislation.

Yet, despite the present administration's studied hostility to business, the chemical industry has made progress. In the field of new developments we have, beside the three new synthetic fibres, new synthet'c fly-spray bases, a new moth-proofing agent, and a new flame-retardant. Particularly notable company expansions include Michigan Alkali's new production of chlorine, Bakelite's new line of acetate molding materials, the hydrogenation of rosin by Hercules, General Chemical's production of cyanide, Reichhold Chemical (formerly Beck-Koller) as a new producer of glycerin, Carbide's commercial output of caproic acid, and a little greater-than-average introduction of new coatings and specialties.

Commercially, however, the most signal triumphs of the year have been the detergent market opened up for tetrasodium pyrophos-

Price Trends In 1938

Item	Jan. 1 1938	July 1 1938	Dec. 10 1938	1938 Low	1938 High
Alcohol, C.D., tks. ....gal.	.29	.25	.26	.23	.29
Alcohol, Amyl (from pentane), tks. lb.	.123	.106	.106	.106	.123
Alcohol, Butyl, tks. ....lb.	.09	.08½	.08½	.08½	.09
Blood, dried, N.Y. ....unit	3.10	3.10	3.10	2.50	3.10
Butyl Acetate, tks. ....lb.	.09	.08½	.08½	.08½	.09
Carbon Black, bulk ....lb.	.02½	.02¼	.03*	.02¼	.02½
Carbon Tetrachloride, drs. ....lb.	.05¼	.05¼	.05	.05	.05¼
Casein, std. ....lb.	.11	.08	.08	.06½	.13½
Cellulose Acetate ....lb.	.40	.40	.36	.36	.40
Chinawood oil, tks. ....lb.	.15½	.143	.14	.095	.15½
Citric acid, bbls. ....lb.	.24	.23	.22	.22	.24
Copper sulfate ....100 lbs.	4.50	4.25	4.50	4.00	4.50
Cresol, USP, drs. ....lb.	.12½	.10½	.10½	.10½	.12½
Cresylic acid HB ....gal.	.89	.73	.73	.73	.91
LB ....gal.	.92	.78	.78	.78	.94
Glycerine, CP, drs. ....lb.	.15½	.14¼	.12½	.12½	.16
Isopropyl acetate, tks. ....lb.	.05½	.05½	.051	.051	.05½
Lead, red, 95% ....lb.	.07¼	.074	.07½	.06½	.08
Lithopone, bgs. ....lb.	.04⅜	.04⅛	.04⅛	.04⅛	.04⅜
Mannitol, pure ....lb.	1.45	1.30	1.15	1.15	1.45
Mercury, flask	81.00	76.50	77.00	72.00	84.50
Methanol, dent. grd. tks. ....gal.	.30	.25	.31	.25	.31
Methyl acetone, tks. ....gal.	.28½	.25	.25	.25	.28½
Naphthalene, bbls., ref'd ....lb.	.07¼	.06¾	.05¾	.05¾	.07¼
Sodium cyanide ....lb.	.16½	.14	.14	.14	.16½
Sorbitol, com. ....lb.	.25	.17	.15½	.15½	.25
Sulfur, crude ....ton	18.00	18.00	16.00	16.00	18.00
Superphosphate 16% ....ton	9.00	8.00	8.00	8.00	9.00
Tankage, grd., N.Y. ....unit	3.00	3.00	3.00	2.50	3.00
Tartaric acid, bbls. ....lb.	.24¼	.27¼	.27¼	.24¼	.27¼
Tetrasodium pyrophosphate ....lb.	.10	.061	.053	.053	.10
Turpentine Savannah ....gal.	.26	.23½	.21½	.20½	.30¾
Vanillin ....lb.	3.00	2.15	2.00	2.00	3.00
Xylol, tks. ....gal.	.30	.26	.26	.26	.30
Zinc oxide, bgs. ....lb.	.06	.06¼	.06¼	.06	.06¼

* Contract price 1939.

phate and an effective use of lignin as a chemical raw material in the manufacture of vanillin. For different reasons they are big potentialities.

Earnings Trends

Company	1st Quarter 1938	1st Quarter 1937	2nd Quarter 1938	2nd Quarter 1937	3rd Quarter 1938	3rd Quarter 1937	9 Months 1938	9 Months 1937
Air Reduction	$795,590	$1,950,938	$888,757	$2,289,498	$962,273	$1,990,995	$2,646,620	$6,231,432
American Cyanamid	94,077	1,364,640	430,572	1,479,685	875,631	1,391,632	1,400,280	4,235,957
Atlas Powder	216,506	361,081	251,145	506,741	278,085	396,488	745,736	1,264,310
Columbian Carbon	707,155	1,448,536	669,917	1,072,150	567,387	1,165,381	1,944,459	3,686,067
Commercial Solvents	236,500†	501,773	149,571†	360,606	164,069	239,997	222,022†	1,102,377
du Pont de Nemours	9,060,602	16,013,346	9,877,003	23,822,888	12,350,713	22,963,289	31,288,318	62,799,523
Freeport Sulphur	427,940	543,287	437,359	736,554	393,505	699,518	1,258,804	1,979,360
Hercules Powder	656,027	1,475,540	571,107	1,561,422	741,501	1,246,811	1,968,635	4,283,823
Mathieson Alkali	172,400	477,051	193,152	516,726	337,408	476,598	702,961	1,470,376
Monsanto Chemical	639,531	1,333,854	523,020	1,441,405	690,743	1,224,499	1,853,294	3,999,759
Texas Gulf Sulphur	1,859,687	2,100,050	1,875,443	3,777,398	1,558,648	3,145,607	5,273,778	9,023,055
Union Carbide	4,209,333	9,947,712	3,721,725	10,505,140	5,451,980	10,013,034	13,383,038	30,465,886
United Carbon	438,364	722,368	374,684	643,000	330,857	551,740	1,143,906	1,917,108
U. S. Ind. Alcohol			4,255*	302,048*				
Westvaco Chlorine	173,857	221,874	180,624	189,482	207,993	216,494	562,454	627,850

† deficit; * 6 months.

Again the new construction program has pointed southwards. Cyanamid's new heavy chemical units at Mobile and Georgetown, S. C.; Carbide's projected new plant in Texas, the doubled capacity of the Dow bromine plant at Kure Beach, and notable expansions of existing plants at Baltimore by U. S. Industrial Alcohol, at Grande Ecaille by Freeport Sulphur, at Shreveport by Southern Acid, at Picayune, Miss., by Crosby Naval Stores, are important steps in this direction.

The Penn Salt-Chipman chlorate plans maturing in Oregon are new and notable. Solvay's new plant at Syracuse, and Sherwin-Williams' new production of titanium pigments at Gloucester, N. J., also stand out prominently in a year when plant-building has been a feature.

In quite a different category, but likely to have important effects, are two new public service organizations. The Chemist Advisory Council and the Chemical Economics Committee of the National Research Council are both set up to do needed work.

Few recent years have been saddened by the deaths of so many important leaders of our chemical world. But on the other hand, we have celebrated an exceptional number of notable anniversaries. Eaton-Clark, Detroit distributors, have reached the ripe corporate age of one hundred. Abbott Laboratories has crossed the half century mark. Diamond Alkali, Hercules, Atlas, and Freeport Sulphur are all twenty-five years old.

For 1939——?

Contract business has generally been quite satisfactory and is certainly good evidence of a continued improvement in demand. A number of plans for expansion have been taken from the files and dusted off. Research for new products is being more actively pushed. It is generally the feeling that 1939 will be a good year.

Heavy Water Experiments

A step towards explaining some of the mysteries of heavy water, which has a density 10 per cent. greater than that of ordinary water, was reported by Professor Victor K. La Mer and Dr. Evan Noonan of Columbia University at the closing session of the three-day American Chemical Society symposium on "Intermolecular Action" at Brown University.

Using heavy water in electric batteries, the Columbia investigators found that the electromotive force, which is measured in volts, was increased by 4.4 thousandths of a volt. Scientists, with this figure ascertained, can now measure the exchange of hydrogen for deuterium, which is a hydrogen atom with a mass twice as great as ordinary hydrogen, that takes place in the formation of heavy water.

"Up until the completion of our investigation, this change of atoms was measured by the resulting chemical properties," Professor La Mer explained. "Such chemical measurements are not as accurate as those performed electrically.

"The results of our experiments also furnish an explanation as to why heavy water is separated from light water during electrolysis. A very small per cent. of heavy water is present in all ordinary water. In order to separate the two constituents, an electrical charge is run through the water by means of two submerged metal poles called electrodes.

"The hydrogen ion in the ordinary water takes on an electron from the negatively charged electrode and goes off in the form of hydrogen gas. In order for a similar reaction to occur in the deuterium ion, an electric force 44 thousandths of a volt stronger is needed. The hydrogen, therefore, is driven off first, leaving behind heavy water with its deuterium content.

"Previously, it was thought that the amount of electrical force necessary to change the deuterium ion into deuterium gas was only four millivolts, or 4 thousandths of a volt, greater than that required for hydrogen. The real explanation of how heavy water is separated comes out more clearly when the new measurements are taken into consideration."

Other Discussions

The session was devoted to discussion of solutions containing ions, molecules in which the number of electrons, carrying negative electric charges, is not equal to the total number of units of positive charge in the nuclei. Ions move in an electrical field just as any charged body moves. The force between two ions, described by Coulomb's law for charge bodies, is proportional to the product of the two charges and inversely to the square of the distance between them. The particles attract each other if one charge is positive and the other negative, but repel each other if both are positive or both negative.

Professor Charles A. Kraus of Brown University, who took office as president of the American Chemical Society on January 1, spoke on "Noncoulombic Interactions in Solutions of Electrolytes"; Drs. L. G. Longsworth and D. A. MacInnes of the Rockefeller Institute for Medical Research, on "Ion Conductances in Water-Methanol Mixtures"; Professor Martin Kilpatrick and L. John Minnick of the University of Pennsylvania, on "Acid-Base Equilibrium in Aqueous and Nonaqueous Solutions"; and Professor Herbert S. Harned of Yale University on "Experimental Studies of the Ionization of Acetic Acid."

Chemical Chronology, 1938

AQUARIUS

January

Du Pont's synthetic rubber plant destroyed by explosion. ● Dean Frank C. Whitmore (Penn State) becomes A.C.S. president. ● Dr. Frank J. Tone is Perkin Medalist. ● Philip M. Dinkins, Cyanamid vice-president, heads drug and chemical section, N. Y. Board of Trade. ● Merck's employee retirement plan goes into effect. ● Compressed Gas Association celebrates silver jubilee. ● Eaton-Clark, Detroit distributor, starts second century of service. ● Federal Trade Commission cites 9 chlorine makers. ● Diamond Alkali celebrates 25th anniversary. ● Monsanto acquires Fiberloid Corp. ● Worst "price-war" in 10 years rages in carbon black. ● Du Pont nets $88,031,943 in '37. ● Sun Oil reports $11,000,000 expansion program. ● Low coke activity creates benzol shortage. ● Beacon Co. acquires M. M. Hobart & Co., Boston manufacturer of specialty oils. ● R. J. Prentiss & Co. acquires insecticide business of Sherwood Petroleum. ● Kessler Chemical offers alpha naphthyl isothiocyanate —a new synthetic insecticide. ● Dr. Leo H. Baekeland to receive '38 Messel Medal of the Society of Chemical Industry.

PISCES

February

TVA Chairman Arthur E. Morgan accuses his fellow-directors of conspiracy and demands a Congressional investigation. ● Dr. James B. Conant elected to honorary membership in the Chemists' Club (N. Y.). ● A.C.S. President-Elect, Prof. Charles A. Kraus and former U. S. Senator Jesse H. Metcalf are speakers at the dedication of Brown University's new chemical laboratories. ● S. W. Jacobs, Electro-Bleaching Gas, re-elected head of the Chlorine Institute. ● Chemist Advisory Council is formed with Dr. Walter S. Landis as president to provide a permanent organization to work on the unemployment problem. ● Dow Chemical is now manufacturing Thiokol, a synthetic rubber, for the Thiokol Corp. ● Penn Salt completes new hydrogen peroxide plant at Wyandotte. ● Freeport Sulphur is still another company celebrating its 25th anniversary. ● Paul R. MacKinney is the new president, United Dyewood. ● Benzol still scarce and so is ammonium sulfate. ● Chemical consumption disappointing. ● A. E. Starkie Co., Chicago, adds to its Clearing, Ill., plant. ● E. Strahl, Strahl & Pitsch, is president, N. Y. Wax Importers' Association. ● Albert A. Harrison, president, Borden & Remington, Fall River distributor, celebrates 50 years of company service. ● Dr. Robert H. Williams, Bell Telephone Labs., awarded Willard Gibbs Medal of the Chicago A.C.S. Section. ● Monsanto '37 net is $5,162,511.

ARIES

March

Congress decides to investigate TVA. ● Chairman Dr. Arthur E. Morgan is removed by the President and Dr. Harcourt Morgan is made temporary chairman. ● NLRB starts hearings at Midland where United Mine Workers charge discrimination against their members by Dow. ● Calco reports that it will carry case to Supreme Court if the NLRB accepts, in its entirety, the intermediary report of Trial Examiner Charles E. Persons. ● I. C. C. gives railroads half a loaf on their request for higher rates. ● Carbide purchases land for new plant at Texas City with first unit to cost $4,000,000. ● Du Pont will have a $500,000 building at the N.Y. World's Fair. ● Work of the Pulp & Paper Laboratory, Savannah, will continue—an emergency fund drive is successful. ● Chemists fight licensing of patents, filing brief through the A.C.S. with the House Committee on Patents. ● John Fritz Medal goes to Dr. Paul D. Merica, International Nickel. ● Dr. Sterling Temple, du Pont, is the Schoellkopf medalist. ● Slight improvement in chemical consumption, but volume is well below normal. ● General Plastics to build a phenol plant. ● Calco acquires Amalgamated Dyestuff & Chemical and John Campbell & Co. ● Alcohol reduced 2c for 2nd quarter. ● Crosby Naval Stores starts its $600,000 plant at Picayune, Miss. ● George B. Heckel, editor, *Drugs, Oils, and Chemicals*, honored by a dinner in N. Y. City, celebrating his 80th birthday. ● Sherwin-Williams buys land at Gloucester, N. J., to make titanium pigments. ● Allied Chemical reports $24,770,845 or $11.19 a share for '37. ● Cyanamid reports $5,268,255 or $2.09 a share. ● Major Theodore Walker elected president, Commercial Solvents.

TAURUS

April

Wheeler McMillen, president, Farm Chemurgic Council, tells 4th annual chemurgic council that power alcohol will be adopted without legislative help. ● Dr. Charles A. Kraus, Brown University and A.C.S. president-elect, is awarded Franklin Medal, Franklin Institute. ● Dr. C. O. Swanson, Kansas State Agricultural College, receives Thomas Burr Osborne Medal of the American Association of Cereal Chemists. ● American Institute of Chemists' Medal is awarded to Dr. Frederick G. Cottrell. ● Cyanides sharply reduced in price (first price change in many years). ● Beacon Co. acquires Scott Chemical, Lynn, Mass., maker of stearates. ● Ethyl-Dow Chemical to build an additional unit at Kure Beach to take care of demand for bromine. ● Acute competition in cresylic acid. ● U.S.I. acquires Robert Rauh, Inc., Newark maker of synthetic resins and ester gums. ● Acticarbone Corp. acquires exclusive rights for North American Continent to the Actisec process of dehydration by adsorption. ● Woburn Degreasing announces plans for developing castor bean uses. ● E. M. & F. Waldo, Muirkirk, Md., applies for permission to reorganize under Section 77B. ● First quarter earnings of most companies reflect poor state of business. ● Turpentine sinks to the lowest price in 40 years. ● The Ellis-Foster Co., Montclair, N. J., files suit against John D. Lewis, Inc., alleging infringement of certain resin patents.

GEMINI

May

President Roosevelt's long-delayed message on phosphates recommends a thorough Congressional investigation of phosphates. ● Robert J. Moore, Bakelite, heads A.I.C. ● Chemical Fund, Inc., formed—an investment company of the management type. ● Prof. Marston T. Bogert, Columbia, awarded Priestley Medal of the A.C.S. ● Atlantic Refining starts $28,000,000 expansion program. ● Potash prices renewed for coming fertilizer year. ● Essential oil houses of Dreyer and Fischbeck merge. ● MCA files brief with House Committee on Patents in support of bill to exclude importation of articles made in violation of U. S. patents. ● Congressional Committee appointed to investigate TVA starts hearings.

CANCER

June

MCA denounces trade pacts at annual meeting. ● E. M. Allen, Mathieson Alkali, re-elected MCA president. ● American Cube Syndicate's suit against Agacide Laboratories, for alleged violation of the Dennis Patent, successful. ● Former TVA chairman files suit, challenging right of President to remove him. ● Joint Congressional Committee (Pope Committee) studying phosphate resources opens its sessions. ● 430 attend 14th annual convention of the National Fertilizer Association and hear Secretary Brand deny need

of large scale fertilizer production by TVA. ● H. M. Hooker elected president, Hooker Electrochemical. ● Charles P. Gulick becomes chairman of the board, National Oil Products. ● The National Bureau of Standards announces that new commercial standards for coal-tar, pine-oil, and hypochlorite disinfectants are effective, also ones for cresylic disinfectant and household insecticides of the fly-spray type. ● Cyanamid buys land near Mobile, Ala., to erect new plant. ● Actual production starts at Victor Chemical's million dollar elemental phosphorus plant at Mt. Pleasant, Tenn. ● Penn Salt takes up option on property at Cascade Locks, Ore., to erect a plant to make sodium chlorate. Chipman Chemical, Bound Brook, N. J., will be distributor. ● Boric acid and borax both up $1 per ton. ● Chemical tonnages show slight gains. ● Tartars strong, glycerine weak. ● Swann & Co. announces production of synthetic paracresol. ● A. H. Mathieu & Co., Paterson, N. J., opens plant at Everett, Mass. ● Chinawood soars through fears of shortage because of Japanese threats at Hankow. ● Beck, Koller, changes name to Reichhold Chemicals, Inc.

LEO

July

Columbia Alkali opens new laboratory at Barberton, Ohio. ● General Chemical opens new office and warehouse at Camden for its Mechling Division. ● Alteration of the minutes of the TVA charged before Congressional investigating committee. ● New vinyl acetate plant of Shawinigan Resins Corp., Indian Orchard, Mass., starts production. ● Stoney-Mueller, Inc., formed by "Bill" Mueller and R. W. Stoney, both formerly with Commercial Solvents. ● National Oil Products acquires Vitab. ● Reichhold Chemicals completes glycerine plant. ● American Cyanamid sells John Campbell & Co., to a group of Campbell employees. ● Moderate improvement in demand for industrial chemicals. ● Sharp advance in crude iodine. ● Verona Chemical, Newark, N. J., plans to make new products, including aromatics, photographic chemicals, etc. ● Vanillin highly competitive. ● Solvent markets weak. ● Cyanamid prices renewed for '38-'39 season. ● Name of United Color & Pigment of Newark, N. J., is changed to United Color & Pigment Co., Division of Interchemical Corp. ● Lead pigments advance. ● S. B. Penick & Co. takes a new plant at Jersey City. ● Dr. Fletcher P. Veitch, chief of the naval stores division of the Bureau of Chemistry & Soils, retires after 40 years and is succeeded by Carl Speh. ● Dow Chemical for year ended May 31 reports $3,895,269.

VIRGO

August

Dr. Harry A. Curtis, TVA chief chemical engineer, resigns. ● A. H. Copeland becomes assistant to George Cooper, Diamond Alkali vice-president in charge of sales. ● U. S. exports of chemicals and related products declined more than 14% in first half. ● Chipman Chemical will erect sulfur grinding plant at Houston, Tex. ● Agacide Laboratories to appeal decision on the Dennis cube root patent. ● Freeport Sulphur is to erect a $120,000 sulfur purification plant at Grande Ecaille, La. ● Solvay plans new $2,500,000 addition at Syracuse. ● Federal Trade Commission charges unfair competition on the part of four makers of calcium chloride. ● Kay-Fries Chemicals, Inc., starts production of formaldehyde. ● Competition drives vanillin down further. ● Leland I. Doan is a vice-president of Dow. ● National Agrol formed under Delaware laws. ● Chester S. Edwards, formerly with Barrett, forms Nitrogen Products, Inc., N. Y. City. ● U. S. I. is completing plant to make cellulose acetate.

LIBRA

September

Carbon tetrachloride slashed ¼c. ● Federal Trade Commission charges price fixing in suit against 20 lime producers. ● Riley family interest in Barium Reduction is sold to J. B. Pierce. ● Dr. Walter S. Landis awarded Perkin Medal. ● Expansion in demand for industrial chemicals. ● Monsanto announces commercial production of "Phosphotex"-tetrasodium pyrophosphate. ● Employees buy Rolls Chemical, Buffalo distributor. ● Abbott Laboratories observes 50th anniversary by completing new research laboratory. ● Solvent markets continue weak. ● Production of butyl alcohol and acetone from molasses will be undertaken at a plant in Puerto Rico. ● Davison Chemical absorbs stock of the Oberphos Co. ● Arthur L. Mullaly, president, Advance Solvents & Chemical, is also elected president, Synthetic Nitrogen Products. ● Mineral Pigments Corp. takes over assets of E. M. & F. Waldo, Muirkirk, Md. ● U. S. I. further expands synthetic resin field by purchase of Stroock & Wittenberg Corp. A. J. Wittenberg continues as president. ● Paramet Chemical terminates sales agency of Stroock & Wittenberg, and appoints number of direct regional sales representatives for sale of its synthetic resins.

SCORPIO

October

Du Pont announces plant to make nylon—new synthetic material which will serve in place of natural silk in hosiery. ● Celanese also reports plans for new plant to make an entirely new yarn suitable for hosiery. ● A. I. Ch. E. re-elects Fred C. Zeisberg president—he dies the following day. ● National Agrol purchases Atchison Agrol. ● Drug, chemical and allied section, N. Y. Board of Trade appoints committee to act as a central clearing house for statistical data. ● Alkali and chlorine prices repeated for '39. ● Monsanto lowers price of phosphorus pentoxide. ● Paul Logue rejoins Monsanto. ● Dr. Joel H. Hildebrand, U. of California, awarded '39 Nichols Medal. ● Paramet Chemical appoints C. Homer Flynn sales manager. ● Sulfur reduced $2 a ton, first decline in years. ● National Paint, Varnish & Lacquer Association holds Golden Jubilee Convention at Atlantic City.

SAGITTARIUS

November

British and Canadian Trade Pacts signed. ● Domestic potash producers form an Export Association with Dean Clark president. ● Charles E. Kelly elected chairman, drug, chemical and allied section of the N. Y. Board of Trade. ● Farm Chemurgic Council moves headquarters to Columbus, Ohio. ● P. Val Kolb forms distributing company in N. Y. City. ● Lammot du Pont opposes profit-sharing in an appearance before a Senate Committee. Believes instead, in "paying high wages based on efficient performance." ● National Association of Insecticide & Disinfectant Manufacturers and MCA seek model insecticide law. ● J. L. Brenn elected president of disinfectant makers for the 2nd time. ● Victor Chemical increases Chicago office space. ● Mercury soars as spot stocks decrease. ● Contract season in full swing with the majority of prices renewed unchanged from current levels. ● Commercial Solvents sells English holdings to United Molasses. ● Naval Stores prices break sharply when government funds run out, taking away a prop from the market. ● Two new plants started in Maine to make starch from potatoes. ● Resumption of shipments of Chinawood oil from Hankow forces lower quotations. ● Barium & Chemical, Inc., formed to succeed J. H. R. Products, Willoughby, Ohio. ● Cyanamid to construct plant at Georgetown, S. C. ● Hooker Electrochemical to build new offices at Niagara Falls and plans to establish company headquarters there. ● Hercules Powder to construct electrolytic plant at Hopewell, Va. ● Charles K. Weston, du Pont publicity head, to partially retire. ● Monsanto plans to issue an additional 50,000 shares of $4.50 cumulative preferred stock. ● Dr. Elvin H. Killheffer is reelected president, U. S. Institute for Textile Research. ● Dr. Leo H. Baekeland is made an honorary member of the N. Y. Chemists' Club.

December

Disclosure that Philip Coster (Musica), president of McKesson & Robbins, had been guilty of mulcting firm of millions in the "fraud of the century" rocks the industry. He kills himself when the full report of the fantastic tale becomes known. ● Alcohol Users Council planned. ● Hercules to erect ethyl cellulose plant. ● Dolomite 4 (all-welded freighter) makes first trip with caustic soda in liquid form. ● Dr. Morris Fishbein, editor, Journal of the American Medical Association, speaks at Board of Trade Luncheon in N. Y. City. ● S. O. C. M. A. honors Herty memory at annual meeting. ● Price agreements in connection with the sale of calcium chloride prohibited by F. T. C. ● Supreme court refuses petition of Chemical Foundation to review patent controversy with General Aniline. ● Percy Magnus retires from presidency of N. Y. Board of Trade after 6 years of service in that office. ● Quotations on carbon tetrachloride changed from pound to gallon basis by one important maker. ● Advance in carbon black slated for 1939 fails to hold because of competition. ● F. S. Washburn appointed director of fertilizer sales in place of the late Warner D. Huntington. ● Reichhold Chemicals buys Lavanburg.

Deaths of the Year

Fred G. Lancaster ● Edward Anthony Mechling ● Kurt Walwer ● Dr. Harlan S. Miner ● Dr. Max Mueller ● Alvin Anthony Hoffmann ● Edward Joel Cornish ● William Davis Ticknor ● Elon H. Hooker ● Dr. John M. Kessler ● Harrison F. Wilmot ● Albert P. Axtel ● Harold J. Rolls ● Charles Holmes Herty ● Dr. G. M. Johnstone Mackay ● Frank M. Bauer ● Adolph Lewisohn ● Russell John Hawn ● Joseph Kerr Cass ● Frederick Clemens Zeisberg ● Dr. Allen Rogers ● Luther Martin IV ● Eugene Y. Burckhalter ● Dr. Alcan Hirsch ● Warner D. Huntington ● Dr. Charles Edward Munroe ● George C. Lewis ● Augustus R. Laucks.

Industry's Bookshelf

Investments and Investment Policies, by Floyd F. Burtchett; Longmans, N. Y.; 821 pp., $4.00. Since 1929 we have developed not only new concepts of investing, but new investment techniques, and this book surveys these expertly and quite accurately.

Unit Processes in Organic Synthesis, edited by P. H. Groggins, McGraw-Hill, N. Y.; 769 pp., $6.00. "A second edition of Groggins"—enlarged, improved by the experience of the first issue three years ago, brought to date—an invaluable book in its field.

Taxation in Egypt, by Sherman LeRoy Wallace, Princeton Press; 512 pp., $6.00. An exhaustive study of a highly perfected early tax system with interesting commentary on its social and financial effects which give it an unexpectedly vivid modern appeal.

Corporations and Their Financing, by Hastings Lyon; Heath, N. Y.; 946 pp., $4.25. The "last word" on this subject—a detailed work built up from the legal foundations—a notable contribution.

The Folly of Instalment Buying, by Roger W. Babson; Stokes, N. Y.; 248 pp., $1.50. Written as a warning to the consumer; but states distinctly disconcerting facts on the burden of the public's "carrying charges."

Industry and Commerce in the City of Rome, by Helen J. Loane, Johns Hopkins Press, Balto.; 158 pp., $1.50. A highly specialized bit of economic history with a fascinating interest for any business antiquarian.

Names of the Month—

A Current Supplement to the Chemical Who's Who

BERRY, James M., pur. agt., The Drackett Co.; b. Covington, Ky., 24 Mar. 1904; mar. Mary Chapman Lowe, Walton, Ky., 26 July 1924; 1 son; educat. U. of Cinc'ti, B.S.C., 1926. Procter & Gamble Co., Clerk, Gen'l Buying Dept., 1924-27; Drackett Co., pur. agt., 1927 to date. Instructor in Purchasing, U. of Cinc'ti, 1934. Author miscellaneous short articles on purchasing. Memb. Ohio Valley Transportation Advisory Board, Cinc'ti Ass'n Pur. Agts. (v-p. 1934-35), Am. Acad. Political & Social Science, Nat'l Ass'n Pur. Agts. (chmn.), Com. on Paper Shipping Containers, Delta Mu Delta, Zeta Chapter (U. of Cinc'ti), Amer. Soc. for Testing Mat'ls, Lambda Chi Alpha, Reserve Officers Ass'n of U.S.A., U. S. Coast Artillery Ass'n. Hobbies: swimming, golf, pistol. Address: 5020 Spring Grove Ave., Cinc'ti, Ohio.

GRIFFIN, Merle L., chem. engr., Shell Develop. Co.; b. Herrodsburg, Ind., 13 Jan. 1905; mar. Winifred Eleanor Davies, Berkeley, Calif., 18 Apr. 1938; 2 sons (by first mar.); educat. Washington Univ., B.S., 1927, M.S., 1929. Shell Petroleum Corp., Jr. chem., 1929-34; Sr. chem., 1934-1936; field rep., Tech. Prod. Dept., 1937-38; chem. engr., Market Develop. Sect., 1938 to date. Memb. A.C.S., Alpha Chi Sigma, Tau Beta Pi, Sigma Xi. Address: Emeryville, Calif.

HALLORAN, Ralph A., mgr., res. & develop., Standard Oil Co. of Calif.; b. Albuquerque, New Mexico, 23 July 1885; mar. Anita M. Young, Berkeley, Calif.; 1 son, 1 dau.; educat. U. of Calif., B.S., 1906. S. O. Co. Refinery, chem., 1907-14, process supervisor & gas engr. prod. & natural gas div., 1915-19; S. O. Co. Mfg., res. ass't, 1919-25; Standard Oil Co., mgr. res. & develop., 1925 to date. Memb. A.C.S., A.E.C., A.S.M.E., A.P.I. Clubs: Claremont Country. Address: Standard Oil Co., 225 Bush St., San Francisco, Calif.

KNOWLAND, Daniel P., chf. chem., Geigy Co., Inc.; b. Marblehead, Mass., 17 Oct. 1885; mar. Helen Bajus, Lowell, Mass., 20 Sept. 1910; 1 son, 2 daus.; educat. Lowell Text. Inst. Leopold Cassella Gmbht, Volontair Abtheiling, 1907; dyer, Ipswich Mill, 1908; Dexter Richards Woolen Mills, dyer & finisher; McCleary-Wallin & Crouse, chem.; Geigy Co., chf. chem., 1910 to date. Address: 515 Hillside Terrace, South Orange, N. J.

MURPHY, George Bernard, mgr., res. & develop. labs., Universal Oil Prods. Co.; b. New York City, 12 Nov. 1890; mar. Meta K. Prange, Grand Rapids, Mich.; 10 June 1922; educat. Columbia Univ., B.S., 1914, Ch.E., 1917. Jackson Lab., du Pont Co., chf. chem., eng. group., 1917-21; Midcont. Pet. Co., chf. chem., lab., 1921-25; cracking engr., Atlantic Refg. Co., 1925-30; Univ. Oil Prods. Co., mgr. res. & dev., 1930 to date. Memb. A.I.Ch.E., A.I.C., A.C.S. Clubs: Chicago Chemists', Edgewood Valley C. C. (pres., 2 yrs.). Hobbies: golf, fishing. Address: 310 S. Michigan Ave., Chicago, Ill.

SAPHIER, Julian, gen'l mgr., Synthetic Resin Div., U. S. Ind. Alcohol Sales Co., Inc.; b. N. Y. C., 26 Dec. 1910; educat. CCNY, B.S., 1931, Ch.E., 1932. Rob't Rauh, Inc., tech. dir., 1932-38; U. S. I. A. Co., gen'l mgr., synth. resin div., 1938 to date. Memb. Amer. Inst. Chem. (fellow), N. Y. Paint Varn. & Lacq. Assn., Synth. Resin Mfrs. Assn. Clubs: Newark Tennis, Newark Athletic. Hobby: tennis. Address: 60 E. 42nd St., N. Y. C.

The Petroleum Factor in Chemical Industry

Part 2

By Gustav Egloff, Ph. D.

IN considering the chemical significance of petroleum in modern economy, the uses of petroleum and its by-products give but a one-sided viewpoint of the industry. Petroleum industries were a market for many products before any industrial uses of their by-products were possible. Many materials from other industries largely chemical have been developed because of the demand created by today's petroleum technology.

Corrosion is a problem which all parts of the oil industry from well drilling to refined products face. The corrosion bill for the oil industry of the world is over $300,000,000 a year. Each separate step in processing has its own type of corrosion which must be met by the chemist, physicist, metallurgist, and engineer. Corrosion in storage tanks, pipe lines, tank cars, and tank ships, and refining to commercial products is not a single problem to combat. However, much progress has been made by the use of chemical and physical methods.

In the production of oil the tubes and gathering lines are chemically acted upon by the soil, underground water, and components of some crude oils. Different areas show different rates of corrosion. In some cases replacements of tubing were necessary every two weeks. Oil tubing corrosion occurs both internally and externally, the former being caused by the water accompanying the oil or by sulfur compounds in the oil and gas. Ground water may be acid or alkaline, acting as strong electrolytes whereby a current is set up between the soil and pipe, thus causing corrosion due to the differences in potential. This electromotive force is neutralized by an induced current which counteracts the electrolytic corrosion.

Pipe lines for oil transportation of which there are some 160,000 miles in the world meet many types of corrosion, and it has been estimated that the annual loss is about $300 per mile of pipe line. In general, pipe line corrosion is external due to the action of the soil; however, internal corrosion from oils containing hydrogen sulfide and other sulfur compounds is also encountered. The soils which seem to be the worst in corrosive action are the black gumbo of Louisiana, the white and black alkali soils of the western United States, and clay and peat soils. Drainage plays an important role in the life of a pipe line since corrosion does not occur without moisture. The soil waters contain electrolytes which accelerate corrosion due to the carrying in solution of acids, alkalies and salts. Dissolved oxygen also accelerates corrosion. Colloidal materials carried in the soil waters tend to protect the pipe by forming impervious films. When silicates and lime in the soils are deposited on the pipe, their colloids form protective coatings.

The methods of protection used for pipes include cement, asphaltic resinous, and waxy coatings. Steel tubing containing copper up to 1 per cent. has remained free from corrosion in the Gulf Coast Texas oil fields.

Other methods include trench draining laying of "French drains" of broken stone beneath the pipe, addition of lime to some soils, and galvanizing or coating the lines with other metals. Alloys of chromium are not used widely due to the high initial cost. The means of protection most generally used include paint, bituminous materials, enamels, and concrete casings. Fabric wraps have been used in conjunction with these coatings, and they consist of burlap, coarse cotton, pitch saturated felts, sometimes of asbestos fiber.

In the past few years many wells have been brought into oil production and increased oil flow by pumping hydrochloric acid into the well. The increase of oil flow from wells has been from a few barrels a day to several thousand. Acidizing of oil wells has been one of the most important developments in oil conservation. However, it also brought other problems, particularly those of increased salt content, oil emulsion, and corrosion in the treatment of crude oil. The acidizing of the wells has caused an increase in the corrosion met with in the pipe lines and well casings. In many cases water is added to dissolve the salt contained in the crudes, forming thereby a synthetic emulsion. Emulsified crude oils are also produced in the oil well due to mixing of the oil and water. Some crude oils contain up to 80 per cent. water in an emulsified form. The water is separated from crude oil by the use of chemicals, electrical methods, heat and pressure, or combinations thereof. In general, the emulsified crude oil is treated in the field to a water concentration of 2 per cent. or less before transportation through pipelines to the refineries.

It is estimated that the average water content of crude oils transported through pipes to refineries is about 1 per cent. Hence 20,000,000 barrels of water were transported as part of the 2,000,000,000 barrels of crude oil produced during 1937. In addition to the volume of water transported with the crude oil, about 80,000,000 pounds of salt were shipped through pipe-

lines either dissolved in the water or dispersed through the crude oil. The emulsified crude oil with its salt content increases the refining costs and to some extent the quality of the refined products. It is strongly suggested that crude oil as produced in the field should be deemulsified and desalted before transportation to the refineries of the world.

The topping and cracking stills meet with severe corrosion due to the deposition and dissociation of the salts at high temperatures. This has been curtailed to some extent by the use of lime, ammonia, and sodium hydroxide. Corrosion is most evident in heat exchangers, crude still tubes, cracking coils, fractionating towers, and condenser equipment. Likewise, through various sections of the equipment, salts are deposited causing loss of efficiency and necessitating frequent shutdowns in some cases. The quality of the residual oils and asphalts has been affected by these salty crudes.

Refinery Corrosion Problem

The refinery corrosion problem is more acute and consequently involves heavier replacements than in the well casing and pipe lining. Due to the high temperatures and pressures employed, all types of corrosion are greatly accelerated. Types of corrosion met with in the refinery are the direct chemical action of components of the crude oils on the equipment and the physical stress encountered under high temperature, pressure, and erosion conditions.

The severest conditions of corrosion are present in cracking stills, particularly in the heating tubes and reaction chambers. The corrosion of the heating tubes internally is mainly due to the hydrogen sulfide produced from cracking. The hydrogen sulfide is most reactive at temperatures of about 400° C. to 450° C. and markedly less at 510° C., whereas the external oxidation is least at the lower temperature range and marked at the higher temperature.

Hydrochloric acid corrosion is most noticeable in those parts of the refinery where the salts from the crudes lodge and decompose. This effect is more pronounced in the sections of the plant where the temperature is lower, since at higher temperatures the direct effect is masked by the more active sulfur.

Failure of the metals used in manufacturing cracking equipment is due to chemical and physical changes taking place at high temperatures. Where high temperatures are employed, metals of sufficient mechanical strength are needed in order that the thickness of the metal required to stand the strain will not be excessive.

Alloy steels have largely replaced carbon steel tubes in modern pipe stills, as well as in pipe connections to vessels. Primarily this has been to reduce corrosion, but greater mechanical strength has been increased as well. The choice of the alloy is largely a question of economics and the balance between the advantages gained with expensive alloy and the less expensive steel. This involves balancing the initial cost of the alloy tubes against the replacement of steel tubes, the shutdown time of the unit in making the replacement, and the hazard due to failure of the steel tubes.

Pearlitic steel alloys have been adapted to high temperature-high pressure service under corrosion and oxidation conditions, so that we are not limited to the austenitic alloys as was the case but a few years ago. This great advance in alloy steels was accomplished by the addition of 0.5 per cent. molybdenum plus 1 to 5 per cent. chromium. Chromium is kept from combining with the carbon present in steel by the addition of stable carbide forming elements such as titanium and columbium which makes the alloy resistant over a wide range of corrosion conditions.

The addition of titanium, silicon, and aluminum by themselves or in combination, has imparted to the pearlitic steels high oxidation resistant properties that within a wide range of temperatures are as good as those attributed to austenitic steels alone.

In the manufacture of reaction chambers, an addition of 1 per cent. molybdenum to low carbon steel practically doubles the strength of these vessels at temperatures of 475° C. and up. Under constant temperature-pressure conditions, approximately one-half the wall thickness can be used as compared to plain carbon steel, with the result that now vessels lined with about 1/16" of a 12-14 per cent. chromium liner can be obtained at the same price as a thick non-lined carbon steel vessel. As illustration a 5 foot by 40 foot with 2⅜" wall carbon steel reaction chamber, weighing about 40 tons, was reduced in weight to 21 tons, when 1 per cent. of molybdenum was added to the carbon steel.

The oil industry has been the driving force behind the metallurgist to discover new alloys to stand up under the service conditions of modern refining of oil. Alloy steels have been developed which give excellent length of life under service conditions, but are still expensive. A vast amount of research is going on to develop new alloys so that the temperatures and pressures of cracking may be enhanced in order to produce even higher octane motor fuels and olefinic hydrocarbons for use in synthesizing newer compounds.

Solvent Extraction

The extraction of motor fuels to separate the high octane fraction from that of lower quality has been in use for increasing the volume of high octane fuels available. Addition of sulfur dioxide and use of low temperatures have been the means by which the Edeleanu process has accomplished this. Other solvents used are liquid carbon dioxide and sulfur dioxide at temperatures of about —115° F. Heterocyclic nitrogen bases such as pyridine, quinoline, quinaldine, the picolines, and the lutidines have been used in conjunction with SO_2 in separating the high octane fraction in cracked naphthas.

The large scale adaptation of the solvent refining methods have only recently been made. Solvent extraction has been found particularly useful in extraction of lubricating oils, the solvents used being nitrobenzene,

phenol, $\beta\beta$ dichlorethylether, furfural, and cresylic acid in conjunction with phenol.

The machines of today call for improved lubricants. The desire is to increase the compression pressure under which combustion takes place in an engine to increase its efficiency. As this pressure increases, natural mineral oils are not wholly suitable. Hence the treatment of lubricating oils has undergone revolutionary changes by the use of solvents, addition of synthetic chemical compounds, and polymerized olefins.

For many years sulfuric acid has been the agent used to refine motor fuel and lubricants. This type of refining of lubricants involves a heavy loss due to polymerization, oxidation, and solubility of certain hydrocarbons in the acid. These effects are eliminated when using solvents to separate the high viscosity index or good propertied hydrocarbons from those of low quality, due to the employment of physical separation rather than chemical refining. Such solvents as phenols with and without propane, dichlorethylether (chlorex), furfural, acetone, nitrobenzene, aniline, chloraniline, and benzol-sulfur dioxide are used for improving lubricating oils.

An important development in chemical synthesis is the production of compounds for lubricating oils in order to improve such properties as oiliness, viscosity index, pour point, and oxidation resistance. In order to improve one or more of these properties products are used such as polymerized hydrocarbon oils, methyldichlorstearate, tricresylphosphate, oxidized petroleum oils and waxes, fatty acids and some of their salts, halogenated hydrocarbons, long chain alkylated aromatics, beta-naphthol, and aluminum naphthenate.

The Manufacture of Lubricants

Lubricants have been manufactured by polymerizing propene, butenes, pentenes, and light fractions of gasoline from the cracking of paraffin wax or waxy oils by means of aluminum chloride. When manufacturing lubricating oils from ethylene, it was found that the viscosity-temperature coefficient was inferior, but by thermal polymerization followed by aluminum chloride treatment an improved lubricant resulted. Since the viscosity of the lubricant is a function of the length of the straight chain in the molecule, the polymerization treatment most advisable in lubricating oil production is that which increases the lengthening rather than the branching of the chain. A further observation has also been made, that the more straight chain the molecule, the less readily it will polymerize.

Polymerized oils give highly increased wearing qualities when added in small percentages to certain lubricating oils. The increase in mileage of a lube oil of 100 viscosity index from Pennsylvania crude to which this highly polymerized oil has been added has been over 40 per cent.

Addition of compounds to lubricants cuts down the wear on motors and starting at low temperature is made more efficient due to the ease with which the oil penetrates and keeps its film strength between moving parts. Low oil consumption and safe lubrication using compounded oils at high temperatures combined with low sludge and varnish forming tendencies are also items when operating at high speeds. Some of these addition agents when added to lubricants in concentrations of about one per cent. will cause the oil to withstand pressures of more than 15,000 pounds to the square inch and reduce the wear of the motor over 40 per cent.

It is estimated that the lubricants and repair bills of the gasoline and Diesel high speed motors used throughout the world can be reduced over $150,000,000 a year by use of the improved lubricating oils available.

One of the major industries and magnificent developments based upon the oil industry is the production of tetraethyl lead for use in motor fuel to improve antiknock properties.

Tetraethyl lead, discovered by Bucton in the year 1859, was a chemical curiosity until found to be a powerful knock suppressor in gasoline. Tetraethyl lead results from the reaction of lead sodium alloy and ethyl chloride, with sodium chloride as a by-product.

In the early days tetraethyl lead as antidetonating agent encountered difficulties by the deposition of lead oxide in the motor. This was largely overcome by the addition of ethylene dibromide which reacts forming lead bromide, a volatile compound leaving the motor with the combustion gases.

To the year 1933 all of the bromine produced in the United States came from the brines pumped from wells in Michigan, Ohio, West Virginia, Texas, and Oklahoma, and from sea water bitterns in California. As the use of tetraethyl lead increased to 65,000,000 pounds in 1937, these sources for bromine were inadequate. A commercial operation was developed for extracting bromine from sea water. The Ethyl-Dow Chemical Company put in a plant at Kurè Beach in North Carolina for bromine extraction from sea water which handles about 8,000,000 gallons per hour of water containing less than 70 parts of bromine per million. It is estimated that 2,000 gallons of sea water must be treated in order to obtain one pound of bromine. About 28,000,000 pounds of ethylene dibromide were produced from this and other sources, during 1937, by the reaction of bromine and ethylene. In addition to ethylene bromide, about 8,000,000 pounds of ethylene chloride were used during 1937 in the tetraethyl lead mixture.

During the year 1937 about 15,000,000,000 gallons or 70 per cent. of the total gasoline consumed in the U.S. was treated with an average of 1 cc. of tetraethyl lead per gallon. The average increase in octane resulting from the addition of 1 cc. of tetraethyl lead per gallon of gasoline is about seven numbers or about 5 per cent. increase in power output and efficiency of the gasoline, resulting in a conservation of about 750,000,000 gallons of gasoline a year, or, expressed in terms of crude oil production, a saving of 40,000,000 barrels. The cost of the tetraethyl lead consumed was about $39,000,000.

One of the most interesting advances in the technology of petroleum is the development of antioxidants or inhibitors for cracked motor fuels and lubricants. Gum formation in gasoline is mainly due to oxidation which gives rise to peroxides, aldehydes, acids, polymerized substances and resinous bodies. If this oxidation is checked by an inhibitor, the refining needed by the gasoline is greatly simplified, costs are reduced and a better product results.

Older methods of refining, particularly the use of sulfuric acid, with its consequent chemical cost, losses, and degrading of the octane rating of the gasoline are definitely obsolete. An inhibitor can produce a satisfactory cracked gasoline from most oils with no refining except sweetening and the finished product will surpass the acid treated product in freedom from gum, and storage stability, as well as octane rating. The use of an inhibitor is inexpensive, involves no costly equipment, and produces no loss of gasoline. Inhibitors are particularly desirable in modern octane fuels, whose refining by older methods involves high losses and considerable reduction in antiknock value.

Antioxidants are effective in almost unbelievably low concentrations. As little as 0.002 per cent. of inhibitor will often make gasoline stable in storage for six months which without this addition could not be used after thirty days. In the United States cresols, aminophenols, naphthols, and wood tar distillate are in commercial use as antioxidants in cracked gasoline blends, and it is estimated that the total volume of gasoline now inhibited aggregates 300,000,000 barrels per year. The saving in refining costs is over $25,000,000.

The use of dyes to color motor fuels is extensive in the United States. The folly of refining to water white color being fully realized, blue, green, red, yellow, orange, purple, bronze, violet, and indigo gasolines are found in the filling stations. By removing the need of producing colorless gasoline, since they make attractive the shades of yellow naturally occurring in cracked gasolines, dyes effect great savings in treating costs, and in addition they give to different brands distinctive appearances.

Compounds used for the commercial dyeing of gasoline are so numerous and belong to so many chemical types that no classification of them in regard to suitability as related to type will be attempted. The group worthy of special mention is the inhibitor dyes, made usually from intermediates having considerable inhibiting value, and retaining in the dye molecule sufficient inhibiting value so as to fulfill the dual function of coloring and producing stability.

Antioxidants are also important in lubricating oils, which sometimes cause serious bearing corrosion. Organic phosphorus compounds are among the substances successful in preventing this. White oils and turbine oils have also been successfully protected against deterioration by inhibitors and their use is being studied for cracked burner and Diesel oils.

An important development was announced at the meeting of the American Petroleum Institute November 16, 1938, by Dr. E. C. Williams of the Shell Development Company, of the synthetic production of glycerol from propene derived from cracked gases. The purity of the product is higher than that from soap manufacture, and due to the enormous availability of propene can be readily manufactured in any quantities desired.

The method used to manufacture the glycerol from petroleum by-products consists in separating the propene from the remaining gases, and chlorinating at temperatures between 400° and 600° C., in which region the reaction is almost entirely substitution. This operation is quite dangerous when not carried out properly, but with proper precautions the required reaction proceeds with about 80 per cent. yield of allyl chloride. The allyl chloride may be converted into glycerol by three alternative processes which have been worked out.

Dr. Williams[1] stated that "From the economic point of view we have to recognize that glycerol is now a by-product of the soap industry. Its price is, therefore, subject to wide fluctuation, as would be expected of a product which must be thrown away if not sold. The market price for the highest grades of glycerol has fluctuated over a period of years from 10 cents per pound, or even a little lower at the depth of the depression, to 60 and 70 cents per pound under war conditions. A year ago the price was 30 cents per pound; now it is, I think, around 13 cents per pound. The average over any long period of years is around 15 to 16 cents. The value of synthesizing glycerol from petroeum, therefore, lies in the possibility which it gives, of stabilizing prices of a universally used commodity. It would not be anybody's intention to compete with existing supplies to the extent of reducing prices to unprofitable levels, but we have processes which, if it were necessary, could produce the whole world requirements of glycerol from petroleum gases. This is sure to exercise a stabilizing influence on a fluctuating commodity. At the same time, if the capacity of existing sources should fall below requirements, the petroleum industry could step quickly into the breach."

Conclusion

Modern civilization owes much to the petroleum industry which has become one of the foundation stones of modern transportation. No industry has developed more rapidly in so many different directions in the past thirty years. The application of science has given an imposing array of not only newer products as were outlined in the first section, but has been the means by which many other contributing industries have become scientifically developed. The petroleum industry has been a contributor as well as a factor in the development of modern industry.

[1] *Ind. Eng. Chem.*, News Edition, No. 23, 632, Dec. 10th, 1938.

New Data on Our Phosphate Reserves

By Poole Maynard

Geologist and Technologist

THE Joint Committee of the Land Grant Colleges and the Department of Agriculture, as of October, 1936, indicated that in Florida, Tennessee, South Carolina, Kentucky and Arkansas, were phosphate reserves that would last the United States, based on the present output of the mines, just about two hundred years. There was also estimated between five and six billion tons of phosphate rock in the Western states of Idaho, Montana, Utah, and Wyoming.

These estimates made by Government scientists were based on data twenty-five years old. It was based only on very high grade phosphate rock. Nobody knew better than these Government scientists themselves that these estimates of phosphate tonnage did not represent our reserves as we view them today, because, improvements in the beneficiation of low grade deposits now in commercial practice, such as oil flotation, separation of the fines in the "hard rock" field of Florida by "tabling," and demonstrations of the separation of phosphates from many impurities by electrostatic methods and the recovery of phosphorus in the electric furnace, all proved very definitely that we should consider deposits that carry only as much as forty per cent. B.P.L. as not only reserves for the future, but even suitable now.

When the Congressional Committee investigating phosphate reserves in the United States was told by H. Allison Webster, an engineer of wide experience in the Tennessee phosphate field, that there was more than five billion tons of phosphate rock in Tennessee with forty per cent. or more B.P.L. and amenable to processes now known for the recovery of P_2O_5, he startled the Committee, for just recently at the Pocatello, Idaho, meeting the Committee had been told that Tennessee had only about a hundred million tons of phosphate left.

But Mr. Webster's estimates were not exclusively his own. They were based on the data assembled over many years by the miners of phosphate rock, data obtained by ten men, engineers experienced in prospecting and estimating tonnage, and all these figures were attested to as conservative by Richard W. Smith, formerly an Assistant Geologist with the Tennessee Geological Survey and now a Geologist with the Department of Mines and Mining of Georgia.

It is easy enough to explain why such estimates had not previously been made public. Private corporations have no reason to make known their reserves unless, as in this case, they are forced to do so to justify their existence. Reserves today are based on a knowledge of beneficiation and phosphorus recovery now known to be practical. Some few years ago, when such processes were not known to be commercial, the so-called low grade deposits could not be considered as reserves.

When the Congressional Committee met in Florida at Lakeland the week of November twenty-eighth, they had presented to them the most astounding information they had yet received about the phosphate reserves of Florida.

The Phosphate Rock Institute composed of the phosphate producers had combed the state for data. They had discovered the fact that the Hawthorn Formation, which underlies the "pebble" rock and underlying the blue clays just below the now workable deposits, carried workable beds of phosphatic marl analyzing from twenty-five to thirty-one per cent. B.P.L. These can be and are graded up in the flotation process to products analyzing from 57 to 61 per cent. B.P.L. So here were reserves, never before considered, that are amenable to present processes of beneficiation with little additional mining and processing costs.

Fortunately the State Highway Department of Florida had made core drills in widely different sections of the State to determine foundation conditions for bridges. Through their cooperation and the State Geological Survey samples of these core drillings were obtained and analyses made. It was found that the phosphatic marls of the Hawthorn Formation were widely distributed over a third or more of the State's area and that there are innumerable beds carrying from 25 to 40 per cent. B.P.L.

The United States Geological Survey issued on November 16 a very important news release on the results of their investigations on Public Lands in Florida. The most significant statement made by Dr. Mansfield of the U. S. G. S. was that 99 per cent. of the area which the Government tested in Polk County, Florida, contains phosphate of at least 40 per cent. B.P.L.; 75 per cent. of the area contains material of fifty per cent. grade or better; and 52 per cent. contains material 60 per cent. or more of B.P.L. He said, "The tracts tested were not selected in accordance with any particular arrangement. They may be considered representative of the field as a whole."

Wayne Thomas of Lakeland, well known expert in phosphate lands, assembled data from all the known authorities. He estimated that 700,000 acres in the Bone Valley Field would yield 25 billion tons of rock

carrying 40 per cent. B.P.L., and easily capable of being raised to grades now being used by processes of beneficiation.

The seven companies operating in the "pebble" field set up their reserves at approximately half a billion tons. They did not include in these estimates "recovery by flotation; any unprospected lands; any grades averaging less than 66 per cent. B.P.L.; any deposits with overburden averaging more than thirty feet; any rock with an average of iron and alumina content of more than 4 per cent. or any deposit with grade under 70 B.P.L. averaging less than 3,000 tons per acre."

The "hard rock" deposits of Florida are an area a hundred miles long and from ten to thirty miles wide, which carries the very high grade deposits.

The writer brought to the attention of the Committee the possibility of locating additional mineable areas of high grade "hard rock," by prospecting along the axes of the anticlines, since he had recently observed that the greatest tonnage and highest grade deposits were found in cavernous areas formed along the axes of the anticlines.

Thomas estimates about three billion tons available in the present workable deposits of "hard rock."

The Government scientists advisory to the Committee were convinced that it was not necessary to limit the mining and exporting of phosphates in the United States. They had the courage of their convictions to make known publicly their conclusions.

Sodium Chlorite Manufacture

Reference has been made in earlier issues (cf. "C.T.J. and C.E.," March 5, 1937, p. 204, and March 26, 1937, p. 271) to the interest being taken by the alkali industry of the U.S. in the production and utilization of the alkali chlorites and chlorine dioxide, according to *Chemical Trade Journal*, Dec. 16, '38, p. 565. Much of the work done on the production side has so far been recorded only in the patent literature, some of the patents cited in our earlier references to the subject being E.P. 460,374, E.P. 460,375, E.P. 308,488, U.S.P. 2,022,262, all granted to Mathieson Alkali Works. A further advance by this concern is now recorded in E.P. 495,289 of 1927 (accepted Nov. 10, 1938), which relates to improvements in the manufacture of water-soluble chlorites. According to this invention, water-soluble chlorites are produced by the reduction of chlorine dioxide in the presence of an alkaline material corresponding to the chlorite to be produced, by an independent reducing agent, the cation of which is a multivalent metal.

It has hitherto been proposed, says the specification, to form sodium chlorite by the reduction of chlorine dioxide by means of sodium peroxide; and to form calcium chlorite by the reduction of chlorine dioxide by means of calcium peroxide. In each of these cases the peroxide ion is the reducing agent, itself being oxidized to free oxygen. These reactions are necessarily limited in application, since the peroxide corresponding to the desired chlorite must be employed. A further serious disadvantage in the use of these particular reagents in a commercial process is the fact that the peroxide reagent is completely destroyed with the liberation of free oxygen, thus preventing any recovery or regeneration of the reducing agent.

When operating according to the process of the most recent invention, the reducing agent employed need not contain the cation of the chlorite to be produced; while the reducing agent is not destroyed as is the case with the peroxides, but the metallic component is merely oxidized to a higher valence level.

According to one embodiment of the process, chlorine dioxide is reduced to chlorite ion in high yield by means of the reducing action of certain metallic oxides or hydroxides. Representative oxides and hydroxides which will successively reduce ClO_2 to chlorite ion are the following: $MnO(Mn(OH)_2)$; Cu_2O $(CuOH)$; PbO $(Pb(OH)_2)$; Ce_2O_3, and FeO.

It has been found that improved efficiencies and economies result from the use of two independent reagents, the function of each of which is independent of the other. The alkaline material to be employed is the oxide or hydroxide of an alkali metal, alkaline earth metal, or of magnesium, the cation of which corresponds to the cation of the chlorites to be produced. Under well regulated conditions over 90 per cent. of the ClO_2 can be converted to chlorite ion by this procedure. The metallic reducing agent may be regenerated, and the process thus made cyclic with respect to this reagent.

Industry's Bookshelf

Compilation of ASTM Standards on Petroleum Products and Lubricants, new 1938 edition, American Society Testing Materials, 260 S. Broad st., Phila., 311 pp., $2.00. New edition of this useful work gives in their latest approved form 61 test methods standardized by the Society, eight specifications, and two lists of definitions pertaining to materials for roads and pavements. Several new standards are given for the first time; also included is the current report of Committee D-2 itemizing numerous changes in the standards.

Microchemical Methods, by C. L. Wilson; Chemical Publishing Co., N. Y.; 196 pp., $3.00. Simple text descriptive and explanatory of the new technique.

Comparative Economic Systems, by Wm. N. Loucks and J. Weldon Hoot; Harper, N. Y.; 837 pp., $3.00. Economic approach to a comparison of capitalism, communism, socialism, and fascism—a timely and important book worth the time of any man who would critically appraise modern political problems.

Cellulose Lacquers, Finishes, and Cements, by Arthur Jones; Lippincott, Phila.; 418 pp., $3.00. Very valuable working book, practically useful for its up-to-date material on formulation and applications.

A Manual of Pharmaceutical Law, by C. Leonard O'Connell and Wm. Pettitt; Lea and Febiger, Phila.; 196 pp., $2.50. A dean of pharmacy and a practicing lawyer have combined to produce a compact, yet comprehensive study of this subject.

The Soya Bean Industry, by A. A. Hovath, Chemical Publishing Co., N. Y.; 221 pp., $4.00. The first really first-class treatment of the soy bean from all its aspects by an outstanding authority.

Seeds of Destruction, by John Blair; Covici Friede, N. Y.; 418 pp., $4.00. A careful, conscientious, helpful criticism of the capitalistic system, which deserves to be thoughtfully read by our business leaders.

Cellulose Developments

1918—1938

By John D. Rue

CELLULOSE twenty years ago was the raw material for such important industries as cotton and linen textiles, paper, nitrocellulose explosives and Celluloid plastics. Today we have rayon, transparent wrappings, a vast variety of plastics, lacquers, coatings for paper and fabrics, cements, etc., all from cellulose and all unknown or scarcely recognized as industries two decades ago. Furthermore, the period since the war has seen profound changes, both materially and geographically, in the commercial sources of the cellulose used in all industries.

Cotton and wood still constitute the most important commercial sources of cellulose. Flax, hemp, manila and sisal are not to be overlooked as raw materials for certain textile and cordage products. The cereal straws and esparto are important to certain branches of the paper industry. But it is to cotton and wood that the newer cellulose industries look for their supply of raw material.

Cotton is the only natural source of large commercial importance in which the cellulose is in a relatively pure form. Even cotton must be purified by a series of mechanical and chemical processes before it can be used in the finer grades of textiles. Cotton linters and hull fiber, byproducts of the cotton industry, require still more drastic purification. Wood yields less than 50 per cent. of economically recoverable cellulose. The remaining material is removed in the processes of isolation and purification.

Cotton and flax are still too costly to find direct use in any but the textile industries. Indirectly, in the form of textile and thread waste and used rags, they find their way as raw materials into the paper industry. However, only the highest grades of paper are made from these materials. Because of the high degree of purity of the cellulose the papers have a high degree of permanence and are valuable for records and currency. Cotton and linen have long been used for these purposes and no remarkable changes have occurred in recent years.

Cotton linters and hull fiber became, during the war, an important raw material for nitrocellulose explosives. Since the war they have found use in such products as nitrocellulose and cellulose acetate as well as some other cellulose esters; also in some ethers which are now beginning to have commercial importance. They are also used for cuprammonium rayon.

Nitrocellulose is used for films, plastics, lacquers and cements. Its use for rayon was discontinued in the United States in 1934. Cellulose acetate is used in filaments, films, plastics and lacquers. Its commercial production began just twenty years ago and is one of the most rapidly growing products of cellulose today.

During the war extensive investigations were in progress looking toward the use of wood cellulose for nitrocellulose explosives. Had the war continued it would undoubtedly have been used for this purpose in the United States. In Europe it was so used on a large scale. Twenty years ago—and today—the major use for wood cellulose was in the manufacture of paper. A small amount was being used for rayon, a product, at that time still known as artificial silk, whose output in the United States had begun on a limited scale. Now, wood supplies probably 70 per cent. of the cellulose used in the manufacture of rayon and transparent wrappings. This use is almost exclusively in the production of viscose. In some cases cotton linter cellulose is blended with wood cellulose to the extent of 25 per cent. A small beginning has been made in the use of wood cellulose for nitrating. Reports of its use in the United States for cellulose acetate have not been confirmed by the writer.

Fig. 1 presents a graphic picture of some of the major relationships between raw materials, intermediates, and products from cellulose and indicates some industries concerned with the production and consumption of cellulose.

The production of cellulose, whether it be for use in the fibrous form such as in textile and paper manufacture or in the dissolved form as in the rayon, plastics and lacquer industries, has become an industry in its own right. Many companies devote themselves exclusively to the production of cellulose for sale as such. Other companies combine the production of cellulose with its conversion into other products. That method of integrated manufacture is characteristic of a large part of the paper industry. In many of the plants of that industry the production of pulp and its conversion into paper take place under the same roof and management.

Cellulose for the dissolving industries, however, is for the most part the product of one industry and its conversion to rayon, plastics, lacquers, etc., takes place in other and distinctly separated industries.

Three plants located in Tennessee and Virginia with a listed capacity of 270 tons per day are reported to be producing cotton linter or hull fiber cellulose. The cellulose is isolated and purified by digestion in caustic soda followed by carefully controlled processes of bleaching.

Linters used in the United States for rayon in 1937 are reported at 40,000 tons as compared with 140,000 tons of wood pulp (*Rayon Organon*, Mar. '38). In 1936 the consumption of linters for cellulose acetate rayon was 22,000 tons and for cuprammonium rayon 6,000 tons. It is estimated that the 1937 consumption was 10 per cent. greater than in 1936 (*Rayon Text. Mo. 18*, 198, Mar. '37). In 1929 the cellulose nitrate lacquer industry is reported to have consumed about 10,000 tons cotton linters. Current consumption data are not available.

At the conclusion of the war large supplies of cellulose nitrate were on hand. For about ten years these supplies met the needs for explosives and for much of the plastics and lacquers.

Cellulose Plastics Production for '36

The production of cellulose plastics for 1936 has been reported (*Modern Plastics 14*, 40—July '37) as follows: Sheets, rods and tubes made with nitrate 16,935,000 lbs., and total made with acetate 13,036,000 lbs. If we assume that this production was all based on cotton linters the consumption may be estimated at approximately 13,000 tons. For 1937 the U. S. Bureau of Census gives the production as 17,723,000 lbs. of nitrocellulose and 13,235,000 lbs. of cellulose acetate sheets, rods and tubes.

The sulphite, soda and kraft processes continue after many years to be standard for the production of wood cellulose (pulp) which still finds its major use as a raw material for the manufacture of paper. There have been, within the last two decades, noteworthy improvements in the methods of purification and bleaching of the isolated cellulose, some important changes in the wood species used, as well as in the geographical location of the pulp mills and of their wood supply.

The four geographical regions which have been chiefly concerned with the migration of the pulp producing industry are: 1) the Northeast, chiefly New York and Maine, 2) the Lake States, chiefly Wisconsin, 3) the Pacific Coast, chiefly Washington, and 4) the Southeast, in which several states have become vitally involved. Fig. 2 (*Pacific Pulp and Paper Industry 12*, No. 5, p. 20, May '38) shows the wood pulp production (all grades, including groundwood) in leading states (exclusive of the southeast) from 1926 to 1937 inclusive. New York, and to a lesser degree, Wisconsin and Maine are giving way to Washington in rate of production.

During the nineteen twenties and again in 1937 there was a large increase in the production capacities for sulfite pulp, chiefly from western hemlock, in the Pacific Northwest. Western hemlock, previously considered of minor importance for chemical pulp, rose rapidly in competition with spruce in the northeastern states. In 1937 the Pacific Coast produced 40.8 per cent. of the domestic sulfite production. Western hemlock was practically the only species used for that production. During the same period the Pacific Northwest became a substantial producer of kraft, both unbleached and bleached. And here again western hemlock has been the important wood used. The growth of the pulp industry on the Pacific Coast has not been without its effect on the chemical industries.

SOME RELATIONSHIPS IN THE FAMILY OF CELLULOSE INDUSTRIES

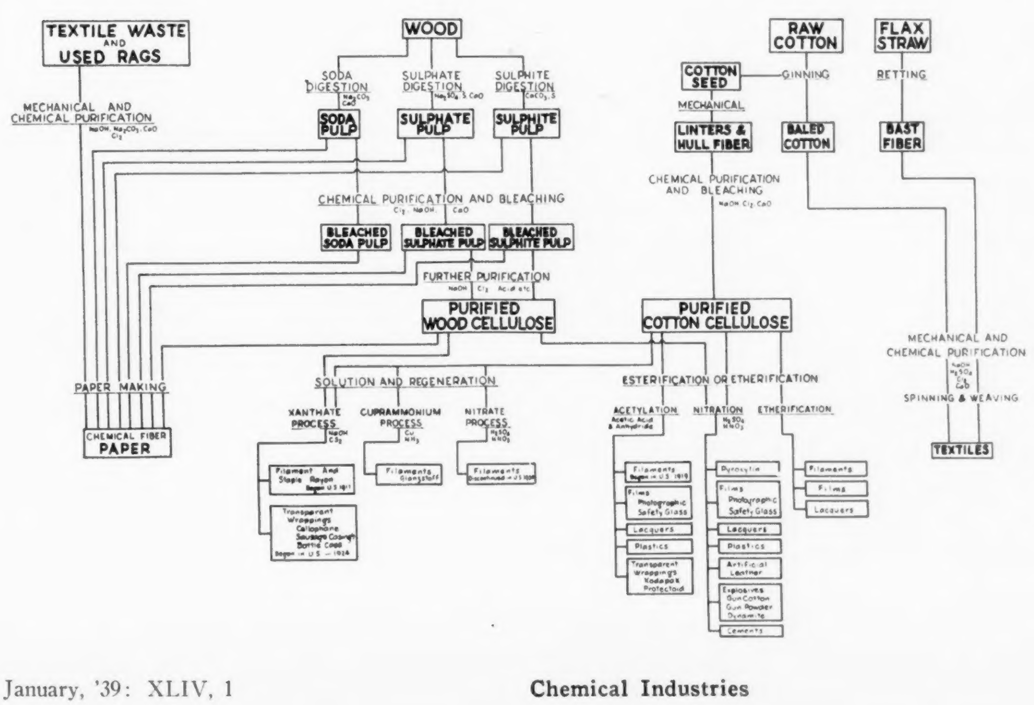
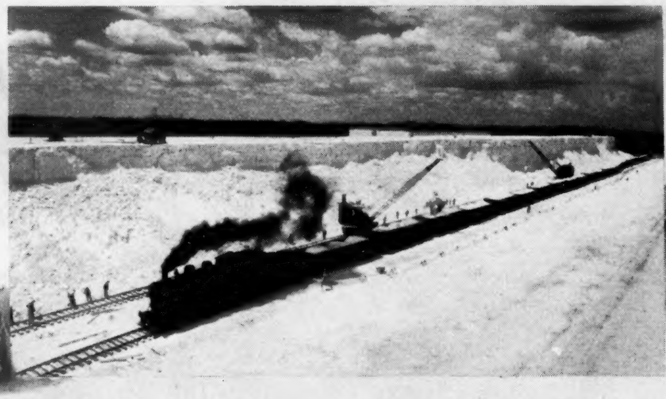
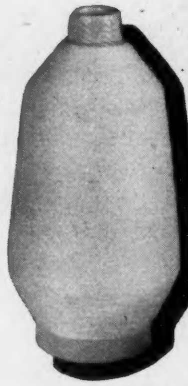


Fig. 1. A graphic presentation of some of the relationships in the family of cellulose industries and of the most important raw materials, intermediates and products of those industries.



LOGS



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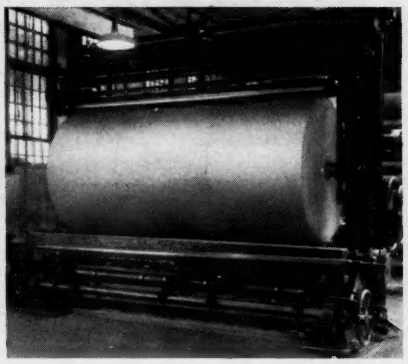
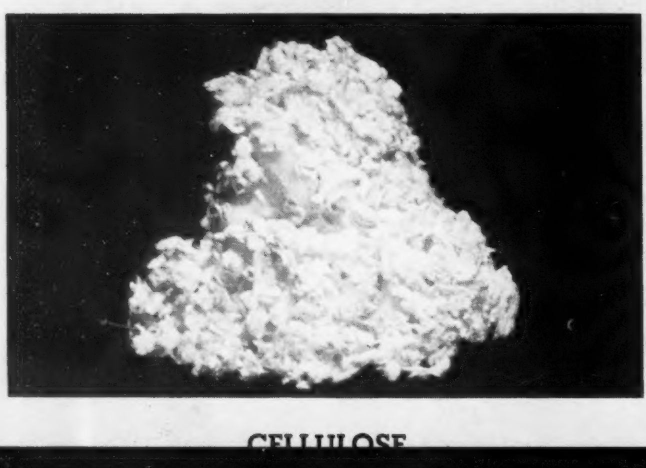
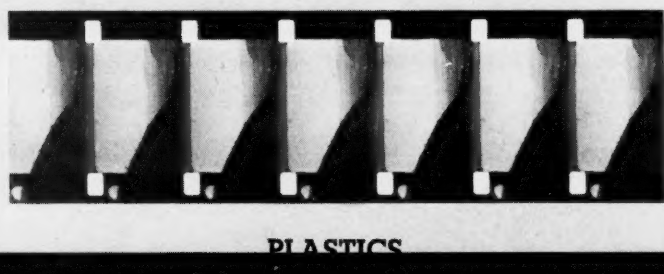


PAPER



CELLULOSE



PLASTICS

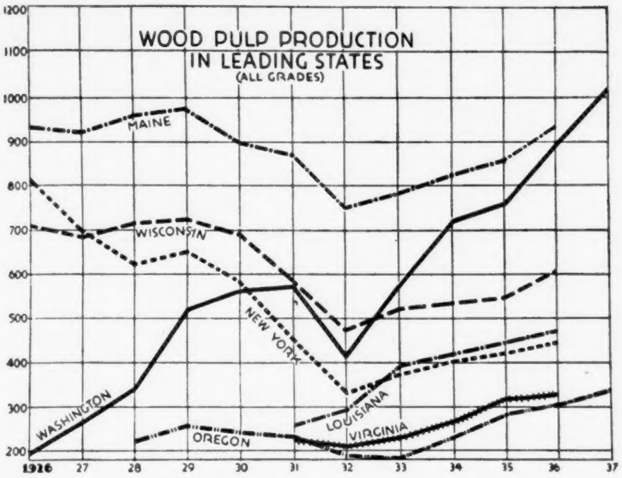


Fig. 2. Wood Pulp Production in leading states from 1926-1937 inclusive.

Sulfur, lime, limestone, salt cake, chlorine and caustic have all been required in increasing quantities. Two new electrolytic plants for the production of chlorine and caustic have been in active operation in that region for the past decade.

Another more recent regional development has been that in the Southeastern states based on the pulping of pine species by the sulfate process. Sulfate pulp manufacture was introduced into this country only thirty years ago. Three or four years later it was started in the South. Twenty years ago the entire domestic annual production of sulfate was less than 150,000 tons. Today the sulfate mills in the South Atlantic and Gulf states, including those in process of erection, have a rated capacity of over 2,500,000 tons per year or a little more than the estimated sulfate production for the entire United States in 1937. Less than half of this capacity was in operation ten years ago. It is important to point out that the southern sulfate industry is equipped to bleach some 12 per cent. of its product in part to medium and in part to high white shades.

The rapid growth of the sulfate industry in the United States has vastly increased demands for salt cake, lime, chlorine, etc. The following are estimates (*Chem. and Met. 44*, 66-7, '37) of chemicals consumed by this industry: The salt cake consumption increased from 90,000 tons in 1927 to 225,000 tons in 1935. The vast growth in the southern sulfate industry since 1935 has brought with it a corresponding increase in salt cake consumption. Chlorine ten years ago did not find an especially important market in the pulp industry. Only 32,500 tons were consumed in 1927. By 1936, however, the consumption had reached 163,000 tons.

Since 1936 three large sulfate bleacheries have gone into operation with a combined potential chlorine demand of 16,500 tons per year. While increases have been made since 1936 in the demand for chlorine in the sulfite industry sulfate pulp is responsible for the largest increases in chlorine demand. It is estimated that in 1935, of all the chlorine produced, 70 per cent. was consumed by the pulp industry. Chlorine for the cellulose industries is being produced in part by the consumer industries, but in major part by independent chemical companies. The recent increases in chlorine capacity have taken place in both, but chiefly in the latter.

In the United States dissolving cellulose made from wood is largely a post-war industry. Its use has been limited almost exclusively to the production of viscose which in turn has found application in the manufacture of rayon filaments, rayon staple fiber, and transparent sheetings. Small quantities may have been used for nitrating especially for explosives and plastics. In the manufacture of viscose some cotton linter cellulose is used. Some manufacturers use 25 per cent. while others use less. The trend is toward a more complete replacement of the cotton linters by wood cellulose which is economically more suitable than the former. Moreover, rayon made from cotton cellulose is wiry and harsh and treatment with softeners and emollients does not entirely overcome these defects.

Domestic Production of Rayon

In 1918 the total domestic production of rayon of all grades was only 7,385,000 lbs. In 1937 the total production is reported to have been 312,236,000 lbs. yarn plus 20,100,000 lbs. staple fiber. Of this total about 238,000,000 lbs. were viscose for which, as estimated by the *Rayon Organon*, 140,000 tons of purified wood pulp were consumed. Wood pulp constituted 78 per cent. of the total rayon grade cellulose consumed in that year. In addition, it is estimated that approximately 43,000 tons of wood pulp were used in the manufacture of 70,000,000 lbs. of viscose transparent sheeting.

Furthermore, considerable, but unknown, quantities of wood cellulose were employed in the manufacture of lacquers and plastics. It is probable that a conservative estimate covering the entire consumption of wood cellulose in chemical usage would bring the total to well over 200,000 tons in 1937 (*Pacific Pulp and Paper Industry, 12*, No. 5, p. 64, May '38).

During recent years a very considerable portion of domestic production of dissolving grades of cellulose has gone to export markets, principally Japan. In 1936 Japan produced 29 per cent. of the world output of rayon which exceeded the U. S. share of 28 per cent. While Japan had raised its production of chemical wood pulps to 444,039 in 1937, it imported during that year 327,988 tons of rayon grade pulp and of which 156,036 tons were supplied by the U. S. (*Pacific Pulp & Paper Industry*, May '38).

It is reasonable to conclude, therefore, that the domestic production of wood cellulose for dissolving usages amounted to over 356,000 tons in 1937. The major portion of this production was on the Pacific Coast where the annual capacity for rayon grade bleached sulfite pulp now totals 243,000 tons. That capacity has been developed within the last fifteen years. Prior to that period the domestic production of

rayon grade pulp was confined to the northeastern states and there to only two or three mills.

Since 1937 two very interesting developments have taken place. One is the construction of a pulp mill (still in process of erection) to make in Florida rayon grade cellulose from southern pine by the sulfite process. The other is the announcement of a sulfate mill in Louisiana to make a similar grade of product also from southern pine. This extension of the dissolving cellulose industry to the southern states marks not only a regional change in the location of the industry, but also the introduction of a new raw material and a process of pulping new to this grade of product. It moves manufacture nearer the domestic centers of consumption.

Still another recent commercial development of importance is the perfection of methods for the production and purification from the hardwoods such as birch, maple, and poplar, of a cellulose which is suitable for rayon as well as for paper. One mill in New England is reported to be making 200 tons per day of this product, half of which enters the rayon field. Substantial tonnages have been shipped to Europe and Asia (*Rayon Text. Mo. 18*, 679-10, Oct. '37, and *18*, 833-4, Dec. '37). This development is of importance in its possible bearing on the utilization of these otherwise little used species in regions which are becoming depleted of their stands of spruce.

Advances in Purification and Bleaching

A byproduct of the war was an abundant supply of liquid chlorine at reasonable prices. Suitable and safe means of transportation were also at hand. Moreover, materials of construction such as cements, coatings, alloys and rubber lined steel, all more or less resistant to the corrosive action of wet chlorine, were made available for the construction of equipment. It was logical therefore that the long-known reactions of chlorine should be applied to the purification of cellulose isolated from wood. The direct acid chlorination of pulp on a practical commercial scale began about ten years ago and has grown very rapidly in the purification of cellulose both for paper and rayon grades. Direct chlorination of soda pulp has resulted in a product of superior brightness. Applied to sulfite pulps it has made possible economies in bleaching and marked improvements in the brightness and strength of the bleached pulps.

Its most important results appeared when it was applied to the bleaching of sulfate pulps. Until direct chlorination was used those pulps could not be bleached to a good white color without great loss in strength. Sulfate pulps were known to contain some color which stubbornly resists bleaching solutions. The product bleached with hypochlorite alone retains a yellowish tint. The dye can, however, be extracted with hot caustic soda, after which the bleaching agents are effective in producing a high white color without material loss of the superior strength which characterizes sulfate pulps. The combination of a direct chlorination and a caustic extraction stage followed by bleaching has made possible the production of white, strong sulfate pulps.

Chemical developments in the purification and bleaching processes have therefore laid the foundations for a new industry, that of bleaching sulfate pulps. That industry already has become well established in all the principal sulfate producing regions. Three and four stage processes of bleaching for paper grades of pulp now scarcely cause comment whereas only a few years ago anything over one stage was noteworthy.

The products of these multistage processes of purifying and bleaching sulfate pulps are in competition with both bleached and unbleached sulfite. Of still greater significance they are being used to make paper and board products of a strength and toughness obtainable from unbleached sulfate.

Direct chlorination and caustic extraction, applied under suitable conditions of operation, serve to improve the quality also of sulfite pulps of dissolving cellulose grades. The alpha content especially can be raised and the product made more acceptable to the viscose manufacturer. The alpha contents of the commercially available celluloses of dissolving grade have on the average increased from around 87 per cent. twenty years ago to over 90 per cent. now with the tendency steadily toward still higher values. Commercial products are also available which have alpha contents of 96 per cent. and over and which find application for special uses.

Research

Interest, financial support and progress in cellulose research have, since the war, been very marked in the United States, in Canada, in Europe, in Asia, and in the Orient. The research has been directed along both fundamental and applied lines and has been conducted under the agencies of governments, universities, endowed institutions and of private companies interested in the production or consumption of cellulose and its derivatives.

The past decade, especially, has been very significant in its contributions to our knowledge of the chemistry of cellulose as a substance and of its chemistry and physics as a unit in botanical plant structures. The scientific accomplishments have, in part, already found practical expression in the industries which have been discussed in this brief review. They give promise, however, of further industrial applications of great import.

New Lumber Disinfectant

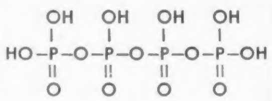
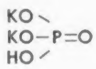
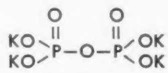
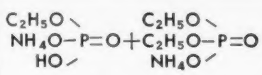
More effective and permanent control of the unsightly "blue stain" in lumber is indicated by a new disinfectant chemical announced by du Pont. Savings to the lumber industry of millions of dollars annually were foreseen by company forest pathologists in describing the new development. Product is to be called new, improved "Lignasan." It contains ethyl mercury phosphate, one of the most powerful fungicides known, and a specific against the fungi that cause sap-stain.

RUBBER GOES TO A PARTY

At the Rubber Ball, held recently in Akron, Ohio, David M. Goodrich, chairman of the board of The B. F. Goodrich Co., son of the founder of Akron's rubber industry, during a broadcast from the ball, predicted that research and development of new uses for rubber and rubber-like materials will assure continued progress for the industry. The Inverness cape he wore is fashioned from a fabric "duranized" with koroseal, a rubber-like substance made from limestone, coke and salt, a Goodrich development. S. B. Robertson, president of the company, is at right. Below, left, Miss Doris Aumann who was awarded the grand prize for a striking Marie Antoinette gown of gleaming satin coated with koroseal. Right, these Martians, who appeared to toast the city's thriving rubber industry garbed in perambulating rubber boots, hot water bottles and countless other oddities in rubber, would have put the famed India Rubber Man of the circus into a jealous dither.

NEW PRODUCTS FROM MONSANTO

TETRAPHOSPHORIC ACID . . . DI POTASSIUM PHOSPHATE . . . TETRA POTASSIUM PYROPHOSPHATE . . . MIXED MONO AND DI ETHYL AMMONIUM PHOSPHATES . . . four new products for industry developed by Monsanto Chemical Company. One or more of them may have a possible application in your manufacturing processes. Write us for further information and samples for your experimentation.

PRODUCT	TETRAPHOSPHORIC ACID (PHOSPHOLEUM)	DI POTASSIUM PHOSPHATE	TETRA POTASSIUM PYROPHOSPHATE	MIXED MONO AND DI ETHYL AMMONIUM PHOSPHATES
FORMULA	 $H_6P_4O_{13}$	 K_2HPO_4	 $K_4P_2O_7$	 $(C_2H_5)(NH_4)HPO_4$ $(C_2H_5)_2NH_4PO_4$
MOLECULAR WEIGHT	338.16	174.23	330.44	143.12 171.16
PROPERTIES:				
Appearance	Clear, slightly brown colored, extremely viscous liquid	Colorless water solution containing 60% solids. Inhibited material has bluish tinge	White, anhydrous powder	Colorless liquid with a slight alcoholic odor
Specific Gravity	2.007 @ 37.8°C 1.981 @ 75.0°C 1.965 @ 100.0°C 1.930 @ 148.9°C	1.70 @ 25°C	———	1.23 @ 25°C
Pounds per Gallon	17.16 @ 20°C	14.16	———	10.25
Viscosity	4.820 centipoises @ 37.8°C 614 centipoises @ 75.0°C 226 centipoises @ 100.0°C 55 centipoises @ 148.9°C	33 centipoises @ 25°C	———	356 centipoises @ 25°C
Solubility	Soluble in water with reversion to ortho-phosphoric acid	71 grams per 100 grams of solution	190 grams in 100 grams of water @ 25°C	More than 85% at room temperature
Hygroscopicity	———	Much more hygroscopic than glycerine. A good humectant	Slightly more hygroscopic than glycerine	Less hygroscopic than glycerine, but a good humectant
SUGGESTED USES	Convenient carrier of a large percentage of P_2O_5 (82-84%). Drying agent. Production of organic phosphates	Lubricant for wool	In shampoos and liquid soaps, in textile oils and soaps, and in wool scouring. An excellent soap builder with high solubility, emulsifying ability and power to suppress formation of insoluble soaps	As a flame-proofing agent in paper and other cellulosic materials

Monsanto Chemical Company
St. Louis, U. S. A.

NEW YORK • CHICAGO • BOSTON • BIRMINGHAM • DETROIT
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CHEMICAL HEADLINERS

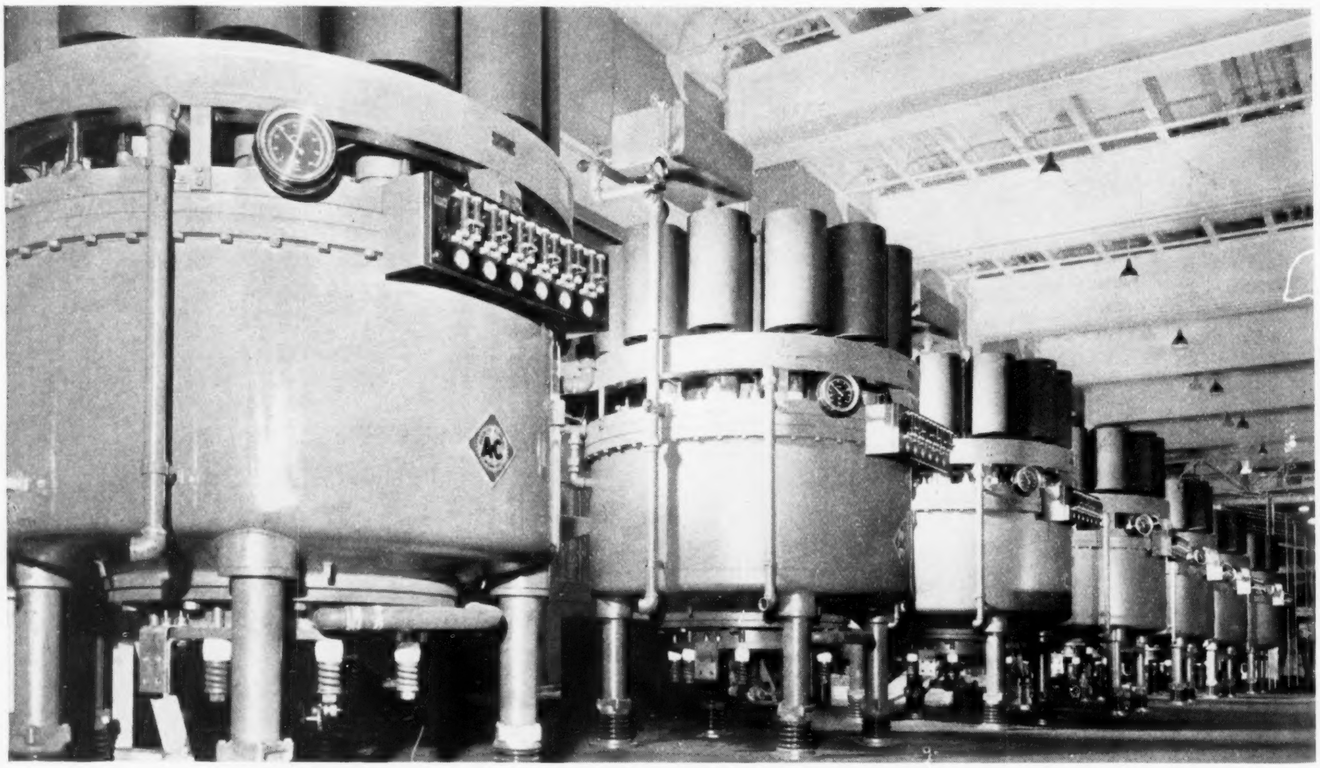
President-elect of the A. C. S. for 1940, Dr. Samuel Colville Lind, dean of the Institute of Technology of the University of Minnesota.

H. V. Cory who has been appointed sales manager of the fertilizer division of American Cyanamid Co.

Meeting of the Drug, Chemical and Allied Trades Section of the New York Board of Trade, held last month, in the Hotel Commodore, New York City. Dr. Morris Fishbein, the guest speaker, talked on "American Medicine and the National Health Program."

Frank S. Washburn who succeeds the late Warner D. Huntington as director of fertilizer sales for American Cyanamid Co.

Plastics: An educational exhibit chart on synthetic phenolic resin manufacture has been made available for schools and colleges, at a nominal charge, by General Plastics, Inc. Exhibit pictorially illustrates the source and manufacture of phenolic resins. Samples show various stages of production and finished examples of ultimate uses of resins in many products.



Power: The compact rectifier tube in the average radio set becomes giant rectifier "tanks" like these, in the hookup of such equipment for the manufacture of aluminum at the Alcoa (Tennessee) Works of the Aluminum Company of America. Installation has a capacity of 55 million watts, and was designed in the Allis-Chalmers laboratories.

Plant Operation and Management

A digest of new methods and plant equipment

Timber in Chemical Plants

By E. E. Halls

WOOD is by no means chemically resistant and its serviceability under any particular set of conditions is exceedingly difficult to predict from laboratory experiments; in fact, service trial may frequently be the only real solution to a quandary. Deterioration is reflected in disintegration of sappy portions, hydrolysis of the cellulose, dehydration or oxidation, with resultant loss of strength so that collapse may occur. It is, however, only direct contact with solutions of chemicals or with strong fumes that the engineer is concerned. For protection against industrial atmospheres and fumes at mild concentrations, assured protection can be secured by painting, two coats of a good bituminous paint generally sufficing.

Apart from physical or mechanical destructive action, due to alternate swelling and shrinkage from wetting and drying, and to solution of tannin, etc. (which may exert a harmful influence on a chemical solution itself), inorganic chemicals will have the following effects:—

1. Even dilute inorganic acids hydrolyze the cellulose, at least superficially.
2. Strong sulfuric acid (80 per cent. or more) causes rapid carbonization on the surface.
3. Nitric acid exerts an oxidizing influence, and strong nitric acid may constitute a fire hazard, particularly if in contact with dry wood.
4. Even mild oxidizing agents such as copper sulfate solutions exert an oxidizing influence.
5. Alkalies exhibit a pulping and colloidalizing influence.

On the other hand, organic acids generally have little action on timber; for example, acetic acids of appreciable strength can be safely handled. Thus, three paramount features emerge which signalize danger, *viz.*, (1) hydrogen ion concentration, (2) dehydrating power, and (3) oxidizing character.

Electroplating processes represent one sphere of applied chemistry in which wood is extensively employed as a constructional material, as it is invariably a prominent constituent of vats and tanks, hoods and ductwork. Cypress is used for hydrochloric acid pickling tanks; pitchpine or Columbia pine is used for the actual plating vat. In the latter instance, the wooden structure provides the shape and strength, this being reinforced externally by steel or preferably Monel metal struts. Plating vats are, however, usually lined: chemical lead is used for acidic electrolytes (*e.g.*, sulfate solutions of copper, nickel and zinc, slightly acid with sulfuric acid); welded steel or Armco iron is used for alkaline electrolytes (*e.g.*, cyanide solutions of copper, zinc and cadmium, strongly alkaline with sodium cyanide, carbonate and hydroxide); chemical hard rubber serves for all types of plating electrolyte, except chromium, for which steel linings are employed. The wooden vat, therefore, has only to withstand the action of plating solutions splashed over its external surfaces, and is usually hosed down at least once a week. Twenty years' service is the minimum to be expected, and relining several times in this period is common. With the slightly acid solutions, unlined tanks are sometimes used, and, of course, the same duration cannot be anticipated, although the chief objection to the practice is leakage from seams, chemicals in solution exerting an uncertain influence upon swelling. Seepage results in an untidy, dirty appearance.

The major concern of the plant engineer in the metal finishing shop is dipping equipment where nitric acid mixtures are present. Nitric acid in a range of strengths, or mixtures of nitric acid and sulfuric acid in varying proportions are used for descaling, for bright-dipping, or for etching prior to plating. The work which is generally non-ferrous, but may also include iron and steel, is treated in baskets or wired in bunches, and immersion liberates a gust of nitric oxide which quickly oxidizes to brown fumes of nitrogen peroxide. The volume of the gas evolved is dependent upon the total surface area of the work treated, acid strength and temperature or cooling efficiency. An added difficulty is that, on account of the rapidity of evolution, a considerable quantity of liquid acid mixture is carried up as spray. This same problem is encountered in foundries and in heat treatment shops where scale is removed from copper, brass, etc., by treatment in nitric acid mixtures. The fume obviously cannot be allowed to dissipate itself uncontrolled in the shop atmosphere, and the dipping process is, therefore, carried out under hoods and the noxious gases, drawn off by ejector fans, being blown to atmosphere or scrubbed in suitable towers.

These nitric acid dipping processes generally are regarded as necessary evils rather than as vital operations essential to the production of the finished article. Consequently, the situation of the tanks receives little attention, and the engineer has little opportunity of using the best equipment for handling the fumes and rendering them impotent. Space and expense rarely permit of earthenware ducts and scrubbers. A wooden hood and ducting, probably *via* a tortuous path, and sometimes scrubbing towers compressed to the shape of the available space, comprise the plant commonly found. Nitrous fume, humidity, nitric and sulfuric acid spray, and heat (from the hot gases) have to be resisted.

The timber employed almost universally in this type of application is teak, on account of its high density and natural oily character. This is essential for the main hood, and, if the fume is ejected straight to atmosphere through a short length of ducting, it should be employed throughout. Heavy waxing of the surface is advantageous. When a long path before ejection has to be catered for, a less expensive timber, and one which is lighter, is sought, except for the first section of trunking, which takes the brunt of the spray. Columbia pine serves this purpose, but it should be finished with two coats of a good acid-resisting bituminous paint on inside surfaces, and painted to suit the factory color scheme on exterior surfaces. If scrubbing towers are incorporated with water circulation, teak is advocated, but careful dual-coat painting of the sections with bituminous paint on inside surfaces before erection, and exteriorly after assembling, is necessary for prolonging life.

In order to obtain some indication of the relative merits of teak and Columbia pine, and of the extent to which the latter could replace the former, a number of immersion and fume tests were made. The materials thus evaluated were: (1) teak, (2) Columbia pine, (3) Columbia pine brush-painted with two coats of bituminous paint, and (4) Columbia pine brush-painted with two coats of red oxide acid-resisting paint.

With specimens (3) and (4) 24 hours air drying between coats, and 48 hours for the final coat, were allowed. Moreover, paints from two different sources were tried in each case.

For the immersion test, specimens were 3 in. long and ½ sq. in. in cross-section; they were immersed in commercial nitric acid (sp. gr. 1.42) to a depth of 1 in. for 48 hours at room temperature.

For the fume test specimens were 6 in. square by ½ in. thick; they were exposed horizontally over the tops of beakers of nitric acid. The test was extended for 48 hours, this comprising 8 hours with the acid gently boiling, 16 hours cold, and then the cycle repeated. The average distance between acid level and sample was 4½ in.

Results of Tests

At the end of the test period, the samples were washed with water and loose, disintegrated wood removed. Comments on their condition are as follows:—

A. Immersion test

1. *Teak.*—Submerged and reduced to a taper, which also extended 1 in. above liquid level. 0.4 in. in length corroded away completely.
2. *Columbia pine.*—Submerged and reduced to a taper, which also extended 1½ in. above liquid level. 0.4 in. corroded away completely. Condition a little worse than (1), it being observed, too, during test, that the acid travelled up more rapidly than it did with the teak specimen.
3. *Columbia pine, bituminous painted.*—Taper effect only slight, effect of acid obvious to only ½ in. above liquid level; no length lost. No difference between the two types of paint.
4. *Columbia pine, red-oxide painted.*—Condition practically as bad as (2); nothing to choose between the two types of paint.

B. Fume test

1. *Teak.*—Depth of attack about 0.15 in., fairly uniform over area exposed, and very little spread beyond this area.
2. *Columbia pine.*—Depth of attack about 0.20 in., uniform but extended beyond the area exposed by about 40 per cent.
3. *Columbia pine, bituminous painted.*—Superficially attacked over entire exposed surface, but not to great depth; depth greatest at centre (0.10 in.). Protection therefore appreciable.
4. *Columbia pine, red-oxide painted.*—Rate of penetration slowed down, but at end of test condition very little superior to the untreated pine.

These simple accelerated tests reveal the superiority of teak over the pine; but they also demonstrate that the application of bituminous paint greatly enhances the resistance of this wood. Several features of the tests must be borne in mind. Briefly these are that the results are relative only to the test conditions obtaining; the bituminous paint must be efficiently applied; there are limitations to the extent of heating which such coatings will withstand; once the coatings have deteriorated, the woodwork is no better than untreated material; periodic repainting must be contemplated, although it may not be easy; and chemical resisting paints of pigmented varieties are not effective, even inert red oxide types.

Conclusion

In the foregoing, only one type of industry (electroplating and finishing) has been specifically mentioned, but closely associated problems are encountered in many others. Except where the expense and space for elaborate equipment is available, these problems have to be solved utilizing wooden structures. It is thought, therefore, that the above angle on the subject should prove generally useful. (Abstracted from *The Industrial Chemist*, Nov., '38, p. 453.)

Improved Superphosphate Method

Combined Granulation—Curing Process

A recently patented process for the combined granulation and accelerated curing of den superphosphate, or fertilizer containing same, reveals an interesting contribution to the technology of superphosphate manufacture. *Chemical Trade Journal*, Oct. 28, '38, p. 401, states that it is described by Davison Chemical Co., in E. P. 491,841.

Process is based upon the unanticipated discovery that by adding a small amount of water to den superphosphate, made in the usual manner, and agitating it at atmospheric pressure and temperature to nodulize the superphosphate and, directly after, without intermediate storage-curing, removing the excess water from the superphosphate by drying with heat while agitating it at atmospheric pressure, a most remarkable increase in curing rate as well as improvement in physical condition is obtained.

In making complete fertilizer by this means, the preferred method is to mix den superphosphate with other fertilizer ingredients, moisten and agitate the mixture at atmospheric pressure and temperature to nodulize it and directly thereafter remove excess moisture from the preformed nodules by heating it.

In a plant described and illustrated in the patent, a crane bucket delivers fresh superphosphate out of the den, or partly-cured den superphosphate, to a feed hopper. An apron conveyer made of slats delivers the superphosphate to a horizontal rotary cylinder (the conditioner) which is operating at room temperature and at atmospheric pressure with a substantial non-drying atmosphere and is set on a slight pitch and provided with lifting vanes to agitate or tumble the material and thereby agglomerate it into discrete firm nodules. The lifting vanes extend about one-fourth of the length of the cylinder from its upper inlet end. The cylinder is about 3½ ft. in diameter, and about ten vanes or flights, approximately 5 in. high, distributed around the inner circumference of the first quarter of the cylinder suffice to initiate the agglomeration action of the superphosphate.

The rate of superphosphate feed is regulated by varying the speed of the slat conveyer and an adjustable gate at the feed hopper. A water-supply line and a recording water meter with automatic pressure adjustment deliver water through pipes to atomizing sprays a short distance inside each end of the cylinder. An ordinary single shell, concurrent, direct heat rotary dryer (heated by oil-burner gases), operating at atmospheric pressure and provided with lifting vanes to agitate or tumble the material, dries the product.

The conditioner is operated at a speed of approximately 7 to 8 r.p.m. and the dryer about the same. The conditioner is about 3½ ft. in diameter and 15 ft. long, whereas the dryer is 3½ ft. in diameter and 30 ft. long, providing a capacity of about 100 tons of finished material per twenty-hour hours. The conditioner is open at both ends so as to maintain a substantially non-drying atmosphere therein.

It has been found that the particle size of the nodules of agglomerated superphosphate issuing from the discharge end of the conditioner is a function of the quantity of water addition.

The material is required to stay in storage for a period of from only two to three days up to a week. During this period the pellets get very much harder, and have a crushing strength in excess of several times as great as fully-cured ordinary den superphosphate. If there is a tendency to form fines in the final product the rate of water addition in the conditioner is increased, and if there is a tendency to form an excessive amount of over-size the water rate is reduced.

According to one of the detailed examples given, a quantity of 100 tons den superphosphate was made up in the usual manner.

This superphosphate was made from 72.9 per cent. BP.L. Florida rock (natural tricalcium phosphate) and 55 Bé. sulfuric acid. The actual batches used in the mixing pan were as follows: 1,125 lb. ground rock; 1,071 lb. 55 Bé. acid. The superphosphate taken out of the den analyzed:

	Per cent.
Moisture	10.29
Total P_2O_5	19.68
Insol. "	2.07
Avail. "	17.61
Free Acid	7.55

Superphosphate of the above composition was promptly thereafter moistened by addition of 2.2 per cent. water and nodulized in the conditioner, then immediately dried in the dryer. The nodule material from the dryer analyzed as follows:

	Per cent.
Moisture	7.72
Total P_2O_5	19.80
Insol. "	1.52
Avail. "	18.28
Free Acid	4.76

Explanation of the process, suggested in the specification, is as follows: The free acid in superphosphate is substantially always H_3PO_4. If any H_2SO_4 is present, it is only in traces. The wetting and nodulizing of the superphosphate may redistribute this phosphoric acid and may likely cause some hydrolysis of the monocalcium phosphate. On drying, the acid is concentrated and this, as well as the elevated temperature of the material in the dryer (about 180°F.) facilitates the attack of the free phosphoric acid on the insoluble P_2O_5. It may be mentioned at this point that with strong phosphoric acid the acidulating reaction is faster than with weak phosphoric acid. This is in contra-distinction to sulfuric acid.

The attempt to dry superphosphate to improve its physical condition is old and the material produced is substantially finely powdered, and there is no curing. More often there is an actual reversion of P_2O_5, that is, an increase of insoluble P_2O_5. It is the nodulizing operation at room temperature and atmospheric pressure preliminarily, but in conjunction with the directly following drying operation at atmospheric pressure which, it is suggested, produces the beneficial results both as to curing and as to physical condition.

Catalytic Hydrogenation of CS_2

The results of the catalytic hydrogenation of carbon disulfide are reported by Fischer and Koch (*Brennstoff Chemie*, 1938, *19*, 245). Hydrogenation both under atmospheric and elevated pressures was studied. Under atmospheric conditions, hydrogen was bubbled through carbon disulfide at such a temperature that the resulting gas mixture has a definite content of disulfide, usually 25 mol. per cent. (To obtain this ratio the temperature of the disulfide had to be 9-10°.) The disulfide-hydrogen mixture was passed over a cobalt catalyst at temperatures from 70-350°. The usual streaming rate corresponded to the passage of 3 litres of hydrogen per hour. For pressure studies, temperatures of 190-300° were used, corresponding to pressures of 164-184 atmospheres. Molybdenum trioxide was used as a catalyst.

Practically complete decomposition of the carbon disulfide took place at atmospheric pressure at all temperatures above 250°. The chief products were methyl, mercaptan and dimethyl sulfide and hydrogen sulfide. No methane formation occurred at 250°, but small quantities were produced at higher temperatures, especially when the rate of streaming and the hydrogen/disulfide ratio was high. Thus at 350°, when the H_2/CS_2 ratio was 5, and the rate of streaming was 16 litres of H_2 per hour, 20 per cent. of the disulfide was converted to methane. Under no circumstances was separation of carbon ever observed.

In the experiments under pressure, considerable amounts of methane were formed at the temperatures studied, using a hydrogen/disulfide ratio of 3. When the disulfide was in considerable excess (e.g. $CS_2/H_2 = 2/1$), considerable amounts of complex organic sulfur compounds were found in the product, among which trithiolformaldehyde was observed in small quantities. (*Chemical Age*, Aug. 27, '38, p. 164).

Production Hydrogen Peroxide

Improvements in production of hydrogen peroxide of a high degree of stability and in high concentration by the cyclic process involving the oxidation of organic hydrazo compounds with an oxygen-containing gas, and the subsequent reduction of the thus-formed azo compounds in an alkaline medium, are claimed by Mathieson Alkali Works, Inc. (assignees of E. C. Soule), in E. P. 489,978 of 1937, described in *Chemical Trade Journal*, Sept. 30, '38, p. 306.

In the reduction step of this process as usually practised, in which the azo compound is dissolved in a suitable solvent immiscible with water and reduced by any of the common alkaline reducing agents, the resulting reaction mixture containing the hydrazo compound and the solution of the hydrazo compound in the solvent after separation from the reaction mixture has always been alkaline. If this freshly prepared solution of the hydrazo compound is oxidized by means of an oxygen-containing gas in the presence of water as a solvent for the hydrogen peroxide, according to the usual practice of the process, it has been observed that the resulting hydrogen peroxide solution will also be alkaline. It has been further observed that such alkaline hydrogen peroxide solutions are relatively unstable and that the yield of hydrogen peroxide is considerably lowered due to decomposition both during the oxidation and following it, decomposition being caused by the presence of this free alkali.

Patent was based on discovery that oxidation of amino-substituted hydrazo compounds gives very high yields of hydrogen peroxide and proceeds very rapidly. It has now been found that high yields and satisfactory rates of oxidation may be obtained with hydrazo compounds containing no amino or other polar substituent group, provided that the solution of the hydrazo compound is freed completely from alkaline substances before oxidation.

New invention accordingly consists in a process for production of hydrogen peroxide by cyclically reducing an azo-type compound containing no polar substituent atom or group, and oxidizing the resulting hydrazo-type compound in a solvent in which the hydrazo-type and azo-type compounds are soluble, but in which the hydrogen peroxide formed is insoluble. Said solvent is immiscible with water and is maintained during the oxidation step in contact with a proportion of water appropriate to dissolve the formed hydrogen peroxide and to produce an aqueous hydrogen peroxide solution of required concentration; the oxidation being effected with an oxygen-containing gas and the reduction being effected in an alkaline medium, in which the hydrazo solution is rendered non-alkaline following the reduction and prior to the oxidation. Thereafter the oxidation is effected in a non-alkaline medium.

As examples of steps which have been found to accomplish the desired improvement successfully, the following are mentioned: (1) The rapid and thorough washing of the hydrazo-containing solution with water immediately after this solution has been separated, carefully, from the amalgam and aqueous portion of the reduction mixture; and (2) the washing of the separated hydrazo-containing solution with an aqueous acid medium.

In an example given in the specification, an oxidation was completed at an elevated temperature using a solution of para-hydrazo-toluene as the intermediate in benzene as the solvent as follows, this solution having been used in the oxidation-reduction-cycle some ten times prior to this run. The reduction of this solution, containing approximately 95.0 gm. para azo-

toluene in 900 gm. benzene, was carried out in a suitably designed reducer employing sodium amalgam and water, as the reducing medium. The freshly reduced hydrazo solution was separated from the mercury and caustic layers, the finely divided droplets of NaOH were allowed to settle as well as possible, and the resulting benzene solution was washed with distilled water several times. The resulting partially alkali-free hydrazo solution was then washed with 300 cc. of 0.1 N H_2SO_4, which completed the neutralization of all suspended and dissolved alkali. This slightly acid, freshly reduced hydrazo body solution was filtered over several thicknesses of filter paper and then transferred to a suitable oxidation apparatus. The oxidation was completed at 57° C. in 2¼ hours in the presence of 50 cc. of water. The H_2O_2 produced was very stable in appearance; no visible decomposition was noticed. This H_2O_2 was stored in ceresin wax-lined bottles for 56 days at a constant temperature of 30° C. after which it was analyzed. No decomposition of this H_2O_2 was found after this period.

Catalysts for Fischer-Tropsch Process

Synthesis of gasoline from carbon monoxide and hydrogen, by the Fischer-Tropsch process, is finding wide adaptation in large-scale industry in the Far East, according to *The Chemical Age*, Nov. 19, '38, p. 391. The Mitsui Mining Co., which has acquired rights to the system in the Far East, is building a plant with an estimated production of 30,000 kilolitres of gasoline annually, and the South Manchurian Oil Liquefaction Engineering Co., founded jointly by Mitsui Co. and the Government of Manchukuo, is also to use the same process in a factory to be built at Fuhsin. The latter, when fully equipped, will produce 100,000 kilolitres yearly.

Success of these enterprises depends in a large measure upon the efficiency and economy of the catalyst employed. The two firms are not likely to use the catalyst discovered and recommended by Dr. Fischer himself, which is nickel containing oxides of manganese and aluminum as promoters, and kieselguhr as carrier. But they will probably use one of those developed in England, such as those discovered by Dr. Genitsu Kita, Professor in the Kyoto Imperial University, and by the Fuel Research Institute of the Ministry of Commerce and Industry, respectively.

Dr. Kita prepared a large range of cobalt catalysts containing copper and the oxides of thorium, uranium and manganese as promoters, and kaolin or kieselguhr as carrier, and discovered that the oxides of uranium and thorium were the most efficient promoters, and kieselguhr the best carrier. A grade, which was made of 80 per cent. cobalt, 10 per cent. copper, 2.5 per cent. thorium oxide, 0.5 uranium oxide and the balance kieselguhr, gave the highest yield (144 cc. of gasoline from 1 cu. m. of synthesis gas). His experiment with nickel, however, was not wholly successful. He concluded that the gasoline yield could not be raised, at least to such an extent that it might be compared with those of other catalysts, unless the metal was treated by complicated methods which would make its commercial application difficult.

Catalysts of nickel, cobalt, aluminum and silicon had their own advantages, yet all failed to yield a sufficiently large quantity of petrol. Finally, Dr. Kita discovered that a nickel-cobalt catalyst prepared by precipitation methods was the most efficient and economical agent for the gasoline synthesis. This catalyst of 50 parts by weight of cobalt, 50 of nickel, 15 of manganese, 3 of thorium oxide, 5 of uranium oxide and 125 of kieselguhr, was reduced with hydrogen for four hours at 400° C. When the synthesis was conducted at 190° C., it produced 166 cc. of gasoline from 1 cu. m. of gas treated. A further study is to be made of the means of producing this catalyst at as low a cost as possible.

The Fuel Research Institute of the Ministry of Commerce and Industry has experimented with practically all the catalysts made of nickel, cobalt and other metals suggested by foreign and Japanese chemists. As a result, Mr. Tsutsumi reported that a nickel catalyst containing 20 per cent manganese, 8 per cent. uranium oxide and 4 per cent. thorium oxide is the best material, yielding 168.8 cc. of gasoline per 1 cu. m. synthesis gas. The reaction is carried out at 200° C. and a gas flow of 6 litres/hour.

Toluene from Cresylic Acid

The Department of Scientific and Industrial Research has issued a report entitled "The Hydrogenation Cracking of Tars, Part IV: The Production of Aromatic Hydrocarbons from Phenols at Atmospheric Pressure." (Fuel Research Technical Paper No. 48, H. M. S. O. 1s. 3d. net, mentioned in *Chemical Trade Journal*, Sept. 23, '38, p. 282.)

Production of low-boiling hydrocarbons from tars and tar oils by the hydrogenation cracking process is carried out by treating the tar with hydrogen under high pressure and at elevated temperatures, the conditions commonly employed being a pressure of about 200 atmos. and a temperature of 400° to 500° C. Parts I—III of this series of reports dealt with this aspect of the hydrogenation of tars. The latest report describes experiments on the conversion of a portion of these tars—the tar acids—to aromatic hydrocarbons by treatment with hydrogen at atmospheric pressure.

Molybdenum oxide supported on active charcoal was found to be the most active catalyst. At a reaction temperature of 450° C. and a throughput of cresol of 0.2 ml. per ml. of catalyst space per hour, the yield of toluene was 70 per cent. by weight of the cresol treated.

Accompanying the main reaction was the formation of a small amount of polymerization products which were deposited on the catalyst, thereby lowering its activity. It was found that the activity of the catalyst was maintained for a longer time if a large excess of hydrogen was used. Attempts to reactivate the "spent" catalyst by heating in air and steam were unsuccessful, since conditions drastic enough to remove the deposit also oxidized the support. Various porous inorganic materials for supporting the molybdenum oxide were therefore tried, and the supported catalysts were found to vary considerably in activity. Bauxite impregnated with molybdenum oxide gave the best results, and was only slightly inferior to active charcoal impregnated with molybdenum oxide. The bauxite-supported catalyst possessed the additional advantage that, after deterioration, it could be restored to its original activity by oxidation in air at a temperature of 500° C.

The basis of a continuous plant was thus indicated and the results obtained justified their confirmation on a larger scale. The design and operation of a small-scale plant capable of treating 2 litres of material per hour is described in section 4 of the report. The plant included two catalyst chambers, which were used alternately. With a throughput of 2 litres of material per hour, the useful life of the catalyst was about five hours, while revivification of the "spent" catalyst occupied from four to five hours. Results are given for the treatment of different raw materials in this plant; as an example, a continuous run using cresylic acid gave a 60 per cent. yield of toluene.

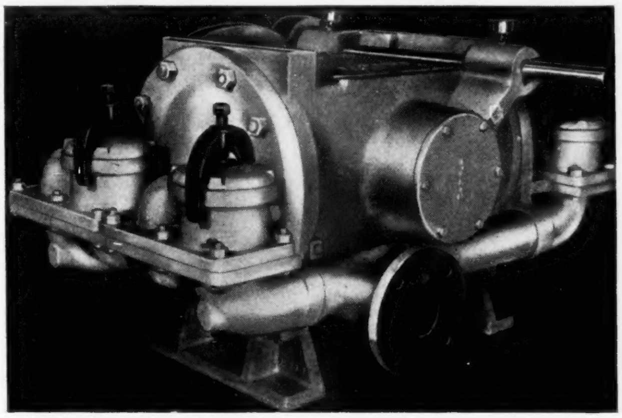
Purifying Caustic-Alkali Solutions

A recent English Patent indicates that silicon compounds may be removed from water solutions of alkali metal hydroxides, such as caustic soda, by digesting the solution with a mixture of two reagents, such as ferric sulfate and hydrate of lime. The digestion is carried on at a high temperature (212° F.), and the solution under treatment is relatively dilute, preferably about a 10% solution. (From *Chemical Topics*, published by Merrimac Division of Monsanto.)

New Equipment

Diaphragm Pump

For pumping metallic salts, metallurgical, mineral and chemical slimes, slurries and sludges, particularly those fluids which contain a relatively high percentage of quick settling solids, this Shriver Diaphragm Pump has been especially designed with intake and discharge manifolds at the bottom of the pump. Pump is of the duplex type. Since the material handled is kept from contact with the actuating mechanism by means of two rubber diaphragms, only the liquid ends, valves, valve seats and manifolds need be made of whatever metal or material is best suited to the operating conditions and chemical characteristics of the fluid. As is readily seen, the liquid ends and piping can be easily removed for inspection and cleaning, while for inspection of the valve chambers only the two yokes and covers in upper half of the chambers need be removed. This is done very quickly and easily. The pump with bottom handling arrangement is available in capacities up to 100 gals. per minute at pressures up to 100 lbs. per sq. in., and may be built specially for larger capacities up to 250 lbs. per sq. inch.



New Centrifugal Pump

An improved design of the single suction open vane impeller type of centrifugal pump has been introduced by the Centrifugal Pump Division of Allis-Chalmers Mfg. Co., Milwaukee, Wisconsin. New pump, known as type PO, is especially designed for handling paper stock of various consistencies, paper mill liquors, or special liquids containing solids other than wood fibre as may be found in the chemical or allied industries. This new design retains all the essential and outstanding features and pumping characteristics found in company's highly successful type SSOR open runner pumps recognized for their high efficiencies and low maintenance costs. In addition, pump is so designed that its complete rotating element may be readily withdrawn from the casing without disturbing the suction and discharge piping connections, or the alignment of the pump and motor.

Safety Flexible Coupling

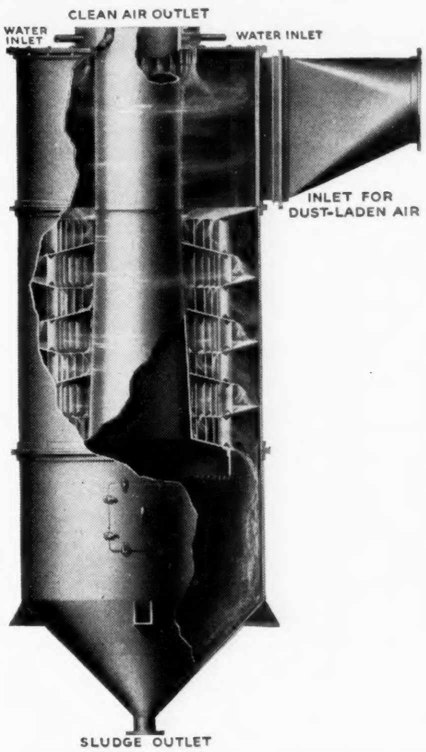
A new flexible coupling for handling misalignment, starting torque, absorbing shocks, etc., on direct connected machinery, which the manufacturer says will provide increased safety and lower maintenance, is announced by Lovejoy Flexible Coupling Co., Chicago. It is recommended for use in industries where explosive and inflammable gases, vapors, and liquids are handled, and where conditions indicate that flexible couplings with iron or steel bodies are not entirely safe because of the possibility of a spark being created by some accidental contact with the iron or steel coupling.

Absorption Cells

By a new process developed by American Instrument Co., Silver Spring, Md., absorption cells are now available with optical flats fused in place, thus eliminating the disadvantages of cells with flats cemented in place. The windows of these cells are flat over their entire area to within 6 wave lengths after fusing. Parallelism of the liquid-glass interfaces are $\pm$ 0.025 mm. in standard cells, and $\pm$ 0.01 mm. in high precision cells. Parallelism of the faces of each window is $\pm$ 10 min. The actual mean length between faces of windows is $\pm$1 per cent. of nominal length, and the actual mean length is marked on each cell to the nearest 0.001 mm. Aminco cells are available in 12 standard styles and 387 sizes, with Pyrex glass bodies and either Pyrex glass or Corex "D" windows, or with fused quartz bodies and windows. These cells are individually hand made in accordance with a carefully controlled process that involves 20 distinct operations, which accounts for their consistent uniformity and unusually close tolerances. The glass windows are ground and polished with the same care as is exercised in the manufacture of the highest quality microscope lenses.

Hydro-Clone Dust Collector

To solve the varied problems of dust collection, Sturtevant Mill Co., Park and Clayton Sts., Dorchester, Mass., offers the Hydro-Clone Dust Collector, described as follows: 1st—An entirely wet process which is highly efficient without moving parts except the exhaust fan which handles only clean air. All of the dust is delivered for disposal in the form of sludge. 2nd—The wet-dry process which uses the cyclone principle for collecting and reclaiming the coarse or granular particles of dust for re-use, and a wet system for collecting the fine or nuisance dust. No moving parts except the exhaust fan. Thus two products are delivered: (A) dustless dust (granules) to be saved and re-used, and (B) nuisance dust in the form of sludge, a waste product. In either case the result is a dustless operation. The Hydro-Clone embodies new and proven principles covering the separation of dust particles from air by washing with water. It employs centrifugal force with water traveling at high velocity to obtain the scrubbing and impinging action so necessary to remove the dust from the air with a minimum of power. The dust laden air enters the top of the Hydro-Clone tangentially and immediately the entire dust load receives an initial wetting during its whirl in the top part of the collector. The large wetted particles of dust serve as carriers of the fine, hard-to-wet, dust particles, much in the same manner that fine dust clings to wetted sawdust as it is swept along the floor.



Booklets & Catalogs

How to get these booklets: Companies will be glad to supply copies free, provided "Chemical Industries" is mentioned and the request is made on company stationery. Your business title should also be given.

Acme Safety Transformer, leaflet, describes compact new instrument, expressly developed to reduce hazards resulting from shock or explosion; of interest to inspectors and maintenance men; approved by Underwriters' Ass'n. Acme Electric & Mfg. Co., Cuba, N. Y.

Centrifugal Pumps, saddle-mounted, vertically-split, Bulletin W-341-B2, on Type H, for oil refinery service; gives features, specifications, accompanied by illustrations. Worthington Pump & Machinery Corp., Harrison, N. J.

Chemicals by Glyco, latest edition, which contains a number of additional features: a complete index of products, formulae, and uses which make it very easy for chemists and technical workers to find any particular piece of information they are looking for; a number of new products are also described, in addition to the complete line of esters, emulsifying agents, synthetic waxes, resins, etc., manufactured by the company. Glyco Products Co., 148 Lafayette st., New York City.

Cleve-O-Cement, special patching composition, new enlarged folder, stresses its value as a patching agent for chipped and rutted floors; gives comprehensive list of concerns who have benefitted from its use. Midland Paint & Varnish Co., 1322 Marquette ave., Cleveland, O.

Comments on Morpholine in Wax Polishes, folder, practical information on use of this product in manufacture of water-resistant polishes; tells how to prepare resin solutions to assure polishes yielding a smooth, even finish, and discusses improved formula for production of any of a variety of desired results. Carbide & Carbon Chemicals Corp., 30 E. 42 st., New York City.

Corrosion-proof Laboratory Equipment, Bulletin No. 503, devoted to details of company's line of laboratory sinks and acid-proof piping; gives specifications, chemical and physical properties, features of design, table of dimensions, list of laboratories using this line, also photographs of various types of equipment. U. S. Stoneware Co., Akron, Ohio.

Durez Molder, November, interesting feature is an item on sticking of phenolic materials and methods of elimination. General Plastics, Inc., No. Tonawanda, N. Y.

Dustrol, leaflet, on new dust control collector, stresses advantages to be gained through its use, describes operation, also applications. Falstrom Co., Passaic, N. J.

Ester Gum for Lacquer Manufacturers, S. & W. Resin News, Dec. 6, '38, general characteristics and tests of product described. Stroock & Wittenberg Corp., 17 Battery pl., New York City.

Foot-candle Meter, Data Bulletin 166, on unit known as Photomet, of interest to illumination engineers, photographers, and laboratory technicians; contains complete data on sensitivity ratings, scale ranges, exposure calculating, prices, and operation. G-M Labs., Inc., 1733 Belmont ave., Chicago, Ill.

Formulating Complete Fertilizers with Aero Cyanamid, Handbook, manual for the use of Aero Cyanamid in the formulation of complete fertilizers; contains table for calculating fertilizer formulas; illustrated. American Cyanamid Co., 30 Rockefeller Plaza, New York City.

H-O-H Lighthouse, December, 1938, discusses chemical treatment of boiler waters. D. W. Haering & Co., 3408 W. Monroe st., Chicago, Ill.

Hydraulic Decoking Systems, for the oil refining industry, Bulletin WP-1099-B20, describes hydraulic decoking, method of operation of new system, economies and advantages, also illustrated. Worthington Pump & Machinery Corp., Harrison, N. J.

Hydraulic Tube Washer for surface condensers, Bulletin W-200-B4, description, dimensions; list of typical users. Worthington Pump & Machinery Corp., Harrison, N. J.

Hytempite, Catalog H. G. 501, describes new plastic, air-setting high temperature cement, for bonding fire brick and shapes with thin, strong, air-and-gas-tight joints; for building monolithic "Gas/Tite" baffles; and for quick hot-or-cold furnace repairs; profusely illustrated with photographs of installations in a wide variety of industries throughout the world. Quigley Co., 56 W. 45 st., New York City.

Indicating, Recording and Controlling Instruments for measuring and controlling temperatures, pressures, flows, liquid levels and humidity, Folder No. G-37, brief descriptions under the instrument illustrations, lists information on models and operating features at a glance; typical installations are shown. Brown Instrument Co., Wayne & Roberts aves., Phila., Pa.

Industrial Ovens and Dryers, Bulletin, describes various types, stressing outstanding features; contains table on thermal conductivity of various materials used for this purpose. Falstrom Co., Passaic, N. J.

"Lightnin" Portable Mixers, Bulletin, concise data on company's line of mixing equipment for the process industries; gives general specifications for buyers, construction features, and illustrations. Mixing Equipment Co., 1087 Garson ave., Rochester, N. Y.

Methods of Working Seamless Tubes and Pipe of Intermediate Grades of B & W Croloys, containing chromium, molybdenum, and other alloying elements, Technical Bulletin 9, outlines proper procedure for fabricating operations, the information being particularly valuable to fabricators of tubes of these alloys. Babcock & Wilcox Co., 19 Rector st., New York City.

Molded Color, booklet, summarizes history and progress of Plaskon Co.'s product, illustrations show the more outstanding applications to which Plaskon has been adapted, also the part it has played in re-modeling many industrial and domestic articles. Plaskon Co., Toledo, O.

Neon Water Gauge Illuminator, Folder, describes water gauge illuminated with Neon, magnifies and illuminates the water level, making it stand out so vivid and distinct that it can be clearly read at a glance—day or night—as far distant as 150 ft. or more. Wright-Austin Co., 315 W. Woodbridge st., Detroit, Mich.

Nickel Cast Iron Data Sheet Section, 1938 revision of data sheets covering compositions and service data on industrial applications of nickel cast iron. International Nickel Co., Inc., 67 Wall st., New York City.

Octyl Alcohol, folder, summarizes use as an anti-foaming agent in many applications, including: lubricating oil reclamation, rubber latex, printing pastes; manufacture of dyes, varnish inks, paint, paper; in air-conditioning sprays; photographic developing solutions; fruit-washing operations, and a variety of similar operations. Recommends use wherever aqueous solutions cause undesirable foaming; tells how to use the new alcohol and gives its important physical and chemical properties. Carbide & Carbon Chemicals Corp., 30 E 42 st., New York City.

Precisioned Steel Panel Boards, folder, gives details of construction, points to follow in ordering panels, blueprint specifications, and photographs of installations. Falstrom Co., Passaic, N. J.

Rotary Pumps, for cargo-unloading from barge or tanker, Bulletin W-475-M2, on Type GEC, gives capacities, viscosities, pressures, and illustrates and describes important features. Worthington Pump & Machinery Corp., Harrison, N. J.

Schimmel Briefs, November, 1938, feature: "Relative Volatilities of Aromatic Chemicals and Essential Oils." Schimmel & Co., 601 W. 26 st., New York City.

Silicate P's & Q's, December, 1938, references to silicates which may prove helpful to the reader in promoting new or useful ideas. Philadelphia Quartz Co., 121 S. Third st., Phila., Pa.

Synthetic Organic Chemicals, December, 1938, feature: "Quinoline and Its Derivatives"; lists new Eastman chemicals. Eastman Kodak Co., Rochester, N. Y.

Tantalum Acid-proof Process Equipment, Booklet, story of tantalum, its discovery and development, chemical and physical properties, and the various types of process equipment to which it has been adapted; story of Fansteel engineering and research, and other Fansteel products described. Fansteel Metallurgical Corp., North Chicago, Ill.

The Caled Cleanser, Nov.-Dec., 1938, describes new synthetic fiber; also items of interest to users of company's line of chemical specialties. Caled Products Co., Inc., Brentwood, Md.

The Givaudanian, Industrial Aromatics Division, November, 1938, feature: "The Use of Rubber in Furniture Has Been Unfairly Attacked." Givaudan-Delawanna, Inc., 80-5th ave., New York City.

The Rex World, Vol. 4, No. 2, story of Rex equipment; its adaptations and recent installations described pictorially. Chain Belt Co., 1643 W. Bruce st., Milwaukee, Wis.

Three-Roller Mills, roller-bearing, water cooled, Bulletin FG-3, describes new design unit No. 59-G; lists specifications; illustrated. Kent Machine Works, Inc., 37 Gold st., Brooklyn, N. Y.

Use of Copper Sulphate in Control of Microscopic Organisms, 1938 edition revised and enlarged, of great interest is the addition of twelve pages of photographs showing the various algae so that anyone experiencing difficulties with water so contaminated can readily ascertain what type of algae is causing the trouble. Phelps Dodge Refining Corp., 40 Wall st., New York City.

Viscosity Tubes, etc., Folder, details air bubble method for determining the viscosity or body of varnishes and lacquers, and equipment necessary for this test; discusses background of test, advantage of bubble method, contrasting disadvantages of the "cup" or efflux method of determining viscosity and the relationship of the speed of the bubble to the tolerance with which the inside diameters are matched; also lists other laboratory devices of interest to chemists, as well as paint and varnish workers. R. P. Cargille, 118 Liberty st., New York City.

Wholesale Price List, December 15, 1938, Fritzsche Bros., 76 Ninth ave., New York City.

Synthetic Methyl Alcohol

To explain in detail the technical and economic foundations of his company's project to manufacture methyl alcohol from coal, F. Lindley Duffield, chairman and managing director of Duffield Coal Products, Ltd., Imperial House, Kingsway, London, W.C.2, has produced a 53-page book entitled "A Technical Treatise on the Practical and Commercial Production of Synthetic Methyl Alcohol as a Motor Spirit from Coal." A general description of the Duffield process appears in *Chemical Trade Journal*, Nov. 11, '38, p. 446.

The raw coal is fed into bunkers, whence it is delivered into two rotary carbonization furnaces. Part of the volatile gases evolved are used for carbonizing and the surplus passed to four boilers for raising steam, one for process and three for power requirements. The coke product cascades over the exit end of the rotary furnaces into air-cooled hoppers, where it is partially cooled by preheating the air being used in the system. Thence it is conveyed continuously by bucket conveyer into the feed hoppers of six water-gas generators. The same conveyer returns underneath the gas generators, collects the ash and deposits it into skips for dumping.

Detailed drawings of most of the plant units, together with flow sheets and heat balances, are given in the booklet. According to Mr. Duffield, the annual production of 120 millions of methyl alcohol as representing the quantity capable of advantageous admixture with the petrol consumption of Great Britain would involve a capital cost of £4,000,000 in plant, while the cost of production of methyl alcohol, assuming coal at twenty shillings per ton, is given as 3.910 pence per gallon. The booklet, copies of which we understand can be obtained by readers interested from the company, will undoubtedly be found of interest, both on account of its information on the Duffield process and because of the considerable amount of statistical data collected by the author, by all concerned about home-produced motor fuel.

New Chemicals for Industry

A digest of products and processes

Lithium in Glass and Ceramics

By Dr. E. Preston

Dept. Glass Technology, The University, Sheffield, England

THE importance and technical uses of the alkali metal, lithium, and its salts have increased manyfold during the last decade. This is at once apparent if current price lists of lithium minerals and chemicals are examined and compared with those of ten years ago. Lithium compounds are now largely used in ceramics for the production of more satisfactory glazes, in the enamelling industry, in glass technology, and they have played a large part in the development of methods of arc welding and air-conditioning. It is the purpose of this article to outline the technology of lithium and its compounds.

Metallic lithium is only of academic interest. It is the first member of the alkali group of metals, lithium, sodium, potassium, rubidium and caesium, and is the lightest metal known. Its atomic weight is 6.94 while that of sodium is 22.997, and potassium 39.10. Many of the important effects of the addition of small amounts of lithium salts or minerals to other products are due to this simple fact that one pound of lithium is chemically equivalent to about 3.3 pounds of sodium or about 5.5 pounds of potassium.

A curious feature of many of the lithium salts, notably the carbonate, is that in their chemical behavior they tend to resemble the salts of the alkaline earth metals, beryllium, magnesium, calcium, strontium and barium, rather than the salts of the alkalies, sodium and potassium. It is by means of the different solubilities of the alkali salts that sodium and potassium compounds may be separated from lithium compounds.[3]

Lithium Carbonate

When additions of pure lithium salts are made to ceramic and glass-making batches the carbonate is the form in which the lithium is usually introduced into the product. Lithium carbonate melts at a much lower temperature than either sodium or potassium carbonate, and forms low melting eutectics with each of these compounds. It is also more readily decomposed by heat than the other alkaline carbonates as is shown by the facts set out in Table I.[4]

Table I

Melting Points and Decomposition Pressures of the Alkaline Carbonates

Compound	Melting Pt. °C.	CO_2 Decomposition Pressure at 1000°
Li_2CO_3	618	95 mm. Hg.[5]
Na_2CO_3	851	1.5 "
K_2CO_3	891	12 " [6]

The Equilibrium Relationships of Lithium Oxide with other Oxides: Attention has already been directed to the fact that the properties of many of the chemical compounds of lithium are somewhat dissimilar to the properties of the corresponding compounds of the alkali metals, sodium and potassium. This is apparent in the study of the lithia-silica system.

Abstracted from *Foote-Prints,* July, 1938, copyrighted by Foote Mineral Co.

Fig. 1 shows the equilibrium diagram for the lithia-silica system determined by F. C. Kracek.[7] Three compounds are formed, namely, $2Li_2O.SiO_2$, $Li_2O.SiO_2$ and $Li_2O.2SiO_2$ containing approximately 50, 33, and 20 per cent. Li_2O, respectively. Molten lithia-silica mixtures are very much more fluid than the molten soda-silica or potash-silica mixtures, and they crystallize much more readily.[8] The compound $Li_2O.2SiO_2$ is capable of

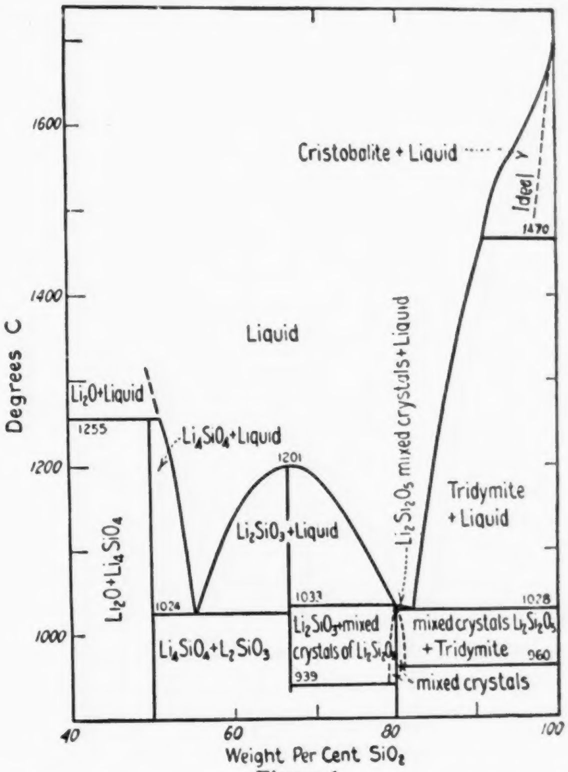


Figure 1

Equilibrium Diagram of the Lithia-Silica System (after Kracek)

dissolving small amounts of SiO_2 and $Li_2O.SiO_2$ in the solid state and forms a narrow range of solid solutions or "Mixed Crystals."

It is interesting to compare the melting points of the different alkaline silicates as is done in Table II.

Table II

Comparison of the Melting Points of the Alkaline Silicates

Disilicates	M. P.	Metasilicates	M. P.
$Li_2O.2SiO_2$	1033°	$Li_2O.SiO_2$	1201°
$Na_2O.2SiO_2$	874°	$Na_2O.SiO_2$	1089°
$K_2O.2SiO_2$	1036°	$K_2O.SiO_2$	976°

With the metasilicates the melting point progressively diminishes with the transition Li $\longrightarrow$ Na $\longrightarrow$ K, but a similar relationship does not hold for the disilicates. In spite of the higher melting point of the lithia-silica mixtures than those of the soda-silica series, the greater fluidity of these mixtures in the molten state is a factor of great importance in the employment of Li_2O as a constituent of ceramic and enamel mixes, for it means that proportionately smaller amounts may be used to obtain the same fluidity.

Although the soda-lime-silica system is comparatively well understood, the corresponding lithia-lime-silica system has not been completely investigated. Figs. 2,[9] and 3,[10] show two sections through this ternary system, and indicate the equilibrium relationships between the compounds lithium and calcium metasilicates, and between the compounds lithium and calcium orthosilicates. Calcium metasilicate forms a solid solution with $Li_2O.SiO_2$ up to about 25 per cent. by weight of $CaO.SiO_2$, and a solid solution of $Li_2O.SiO_2$ in $CaO.SiO_2$ may contain up to approximately 20 per cent. $Li_2O.SiO_2$. The eutectic formed by these two solid solutions contains approximately equal proportions by weight of the two metasilicates and melts at 980° C. The orthosilicates, $2Li_2O.SiO_2$ and $2CaO.SiO_2$, also form series of solid solutions, or mixed crystals, and the liquidus temperatures of all mixtures of these silicates are shown in Fig. 3.[10] A compound $Li_2O.CaO.SiO_2$ is formed by the decomposition of the solid solutions. Other systems which have been partially investigated containing lithia are the SiO_2-Li_2O-SrO, and SiO_2-Li_2O-BaO systems,[11] the equilibrium relationships between the metasilicates being similar to those for $Li_2O.SiO_2$ and $CaO.SiO_2$ shown in Fig. 2. A similar diagram, showing a eutectic between two solid solutions was found by H. S. van Klooster[12] in his study of $Li_2O.SiO_2$-ZnO.-SiO_2 mixtures. In the lithia-alumina-silica system the following compounds are characterized, $Li_2O.Al_2O_3$.-$2SiO_2$ (also known as eucryptite) and Li_2O.-$Al_2O_3.4SiO_2$ which is the chemically pure form of the well known mineral spodumene. An equilibrium diagram of some importance is that showing the equilibrium relationships between lithium orthosilicate, $2Li_2O.SiO_2$, and zirconium metasilicate, $ZrO_2.SiO_2$, shown in Fig. 4.[13] In this system a compound $4Li_2O.3ZrO_2.5SiO_2$ is formed, melting at 1152° C. It will be noted that this compound may be regarded as a union of the two silicates thus, $2(2Li_2O.SiO_2).3(ZrO_2.SiO_2)$. The eutectic formed between this compound and lithium orthosilicate occurs at approximately 30 molecular per cent. $ZrO_2.SiO_2$ and melts at 1021°.

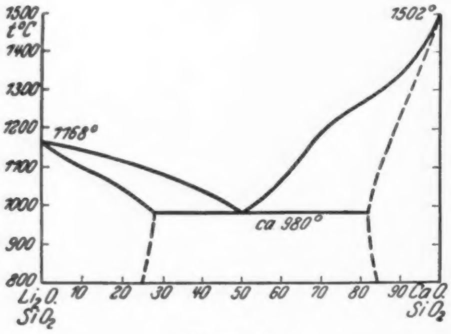


Figure 2

Equilibrium Relationships Between Lithium and Calcium Metasilicates (after Wallace)

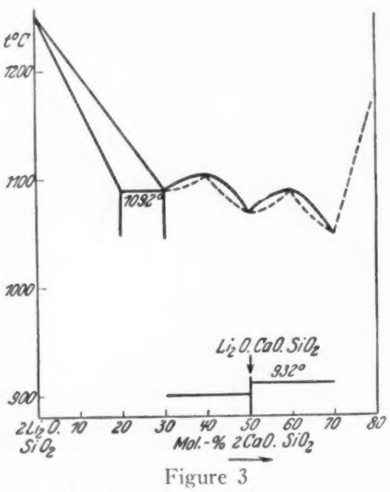


Figure 3

Equilibrium Relationships Between Lithium and Calcium Orthosilicates (after Schwarz and Haacke)

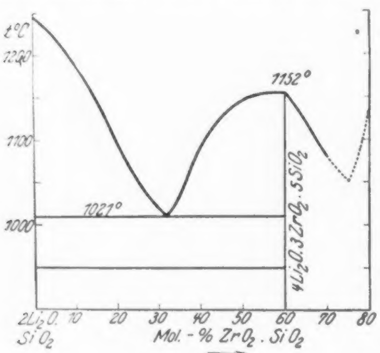


Figure 4

Equilibrium Relationships Between Lithium Orthosilicate and Zirconium Metasilicate (after Schwarz and Haacke)

Recently, R. F. Rea[14] has determined the fusion points of mixtures of magnesium and lithium sulfates and found a eutectic between these compounds at 76 per cent. Li_2SO_4 which melted at 664° C. It appeared also that some solid solution of $MgSO_4$ in Li_2SO_4 took place up to about 15 per cent. $MgSO_4$. C. Kroger[15] has reviewed work on the Li_2O-SiO_2-CO_2 system and the interaction of lithium carbonate with lithium silicates and silica. It is a somewhat surprising fact that reaction takes place between $Li_2O.2SiO_2$ and Li_2CO_3 at a temperature as low as 318° C.

Natural Sources of Lithium Compounds

An account of lithium ores and natural lithium minerals has recently been given by G. C. Betz.[16] In general, lithium mineral deposits are by no means so uniform in composition as corresponding sodium and potassium minerals. Indeed, there are only three of numerous lithium-bearing minerals which occur in sufficiently large deposits, and contain sufficient lithium to make their working an economic project, whose composition may be relied upon with any degree of certainty. These minerals are:

(1), a highly complex lithium aluminum phosphate containing fluorine, known as amblygonite.

(2), a lithium aluminum silicate, $Li_2O.Al_2O_3.4SiO_2$, known as spodumene, containing 8.4 per cent. Li_2O when pure, but commercial samples are said to vary between 4.5 and 7.5 per cent. Li_2O, and

(3), a lithium aluminum fluosilicate, known as lepidolite, which varies widely in composition according to locality.

Of these minerals, which have many commercial applications, amblygonite has the highest lithia content, commercial samples averaging 8.21 per cent. Li_2O. It is very largely employed for the manufacture of lithium chemicals, but finds application also as a fluxing agent in ceramics, in opal glazes and in certain types of enamels.

Spodumene is the mineral which is used more frequently in commerce, and typical analyses of spodumene, potash feldspar and soda feldspar are given in Table III.

Table III

Typical Analyses of Spodumene, Potash and Soda Feldspars

	Spodumene[17] %	Potash Feldspar[18] %	Soda Feldspar[18] %
Li_2O	6.78	—	—
K_2O	0.69	12.10	0.41
Na_2O	0.46	1.82	9.37
SiO_2	62.91	66.72	66.22
Al_2O_3	28.42	18.52	21.76
Fe_2O_3 FeO	0.53	0.08	0.04
MgO	0.13	Trace	Trace
CaO	0.11	0.30	2.06
Ignition loss	0.28	0.36	0.16

Although spodumene is a comparatively refractory substance, its melting point being about 1425° C., mixtures of spodumene and feldspars have fusion points as low as 1080° C. J. E. Boyd[19] found that additions of calcined spodumene up to 20 per cent. to mixtures of the feldspars shown in Table III, lowered the pyrometric cone equivalent of the mixtures very rapidly, the area of lowest P. C. E. values having the limits of composition shown in Table IV.

Table IV

Limits of Composition of Lowest Melting Mixtures in the System Spodumene-Potash Feldspar-Soda Feldspar

	Maximum %	Minimum %
Spodumene	35	15
Potash Feldspar	50	25
Soda Feldspar	50	20

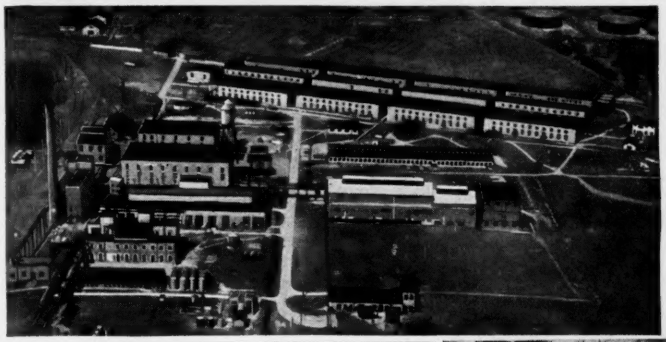
 Prepared Monthly by U. S. Industrial Chemicals, Inc.

SOLVENT NEWS

Reg. U. S. Pat. Off.

January ★ A Monthly Series for Chemists and Executives of the Solvents and Chemical Consuming Industries ★ 1939

U.S. INDUSTRIAL CHEMICALS, INC. NEW NAME FOR U.S.I. SUBSIDIARY



EFFECTIVE JAN. 1

Indicates Further Extension Of Activities In Chemical Field

President C. S. Munson announces that since Jan. 1, 1939, all manufacturing and selling activities of the U. S. Industrial Alcohol organization, with the exception of resins, are being conducted by U. S. Industrial Chemicals, Inc., a wholly owned subsidiary, formerly known as U. S. Industrial Alcohol Sales Co., Inc. This change of name designates more accurately the present nature of the U.S.I. organization's business and reflects also its greatly widened scope in the chemical field. The same organization and plant facilities will continue to serve U.S.I.'s customers as before.

Expansion Since 1906

U. S. Industrial Chemicals, Inc., today manufactures widely diversified chemical products and supplies them to virtually every important industry using such chemicals in its processes. The contrast with 1906, when U. S. Industrial Alcohol Co. was organized is sharp. Its sole product then was industrial alcohol. Today the U.S.I. organization manufactures and sells solvents, chemicals, resins, intermediates, anti-freeze, industrial alcohols (pure and denatured), and a vitamin concentrate for stock and poultry feedstuffs.

Upon its incorporation in 1906, U. S. In-

(Continued on next page)

SOLVENTS AND CHEMICALS are manufactured by U.S.I. at its 40-acre Curtis Bay, Md., plant (upper left). The aluminum stills pictured above are used in the production of synthetic resins at Newark, N. J. Not shown, but soon to begin production is U.S.I.'s cellulose acetate plant located at Baltimore, Md.

Ethyl Formate Easily Removed from Resins to Make New Photo Films

ROCHESTER, N. Y.—What is probably a hitherto unsuspected solvent use for ethyl formate is revealed in a patent just issued to two inventors here.

It tells how polyvinyl formaldehyde acetal resins can be made into flowable compositions, easily adaptable to sheet and film manufacture, by dissolving them in ethyl formate. Previously, the patentees state, it was not practical to employ the resins in this manner because of their high solvent-retaining property.

Ethyl formate appears to be the only solvent which is not retained. In fact, the inventors declare, "its replacement with other solvents such as methyl acetate, ethyl acetate, propyl formate, ethylene chloride, etc., has been found to be unsatisfactory."

Polyvinyl formaldehyde acetal resins, the patent papers explain, may be prepared by

(Continued on next page)

Blame Two Bacteria For Failure of Marine Paint

Failure of marine paints may be traced to the combined action of two varieties of bacteria, experiments in France indicate.

According to *Paint Manufacture* these experiments show that the bacteria form a double layer film which is actually harmful to the paint even though it prevents the formation of barnacles.

The experimenters explain that the outer layer of the film consists of *Bacteria subtilis* which would preserve the paint by protecting it against oxidation except that it fosters the growth of an inner layer of *Bacteria sporogenes* with the ability to produce oxygen and violently activitate oxidation of the paint. The net result is said to be premature aging and cracking.

200 Tons of Pigment

NEW YORK — Painting the buildings of the New York World's Fair 1939, which is being carried out in a plan following the tints of the rainbow, will require a total of 200 tons of pigment, Fair officials declare.

U.S.I.'s original alcohol plant in 1906 (left). Today's Baltimore unit (above) is the largest of its kind. Other U.S.I. plants are located at New Orleans, La.; Anaheim, Calif.; Newark, N. J., and Chicago, Ill.

Uses Absolute Alcohol Medium for Production Of Laevo-Ascorbic Acid

BASEL, Switzerland—By employing acidified anhydrous alcohol as the reaction medium, commercial yields of pure laevo-ascorbic acid may be prepared from 2-keto-laevo-gulonic acid, or its hydrolyzable derivatives, an inventor of this city claims in a new U. S. patent.

In a typical procedure, 204 parts by weight of 2-keto-laevo-gulonic-methyl-ester are dissolved in 4000 parts by weight of absolute alcohol, and 120 parts by weight of hydrogen chloride passed into the solution, according to the patent. After boiling 4 hours under reflux, the mixture is crystallized under vacuum, soaked in butyl alcohol and washed with acetic acid and ether.

The remaining laevo-ascorbic acid may be further purified by crystallization from methanol, the inventor states.

Manufacture of New Film Aided by Ethyl Formate

(Continued from preceding page)

reacting 2200 parts of polyvinyl acetal, 1745 parts ethyl acetate, 1625 parts ethyl alcohol (95%) and 788 parts of trioxymethylene, followed by suitable heating, agitation and purification.

A typical flowable composition may be obtained by dissolving 100 parts of resin in 400 parts of ethyl formate. While these compositions may be adapted to varnish manufacture, films and sheets prepared from them possess desirable properties for the support of light-sensitive photographic coatings, it is claimed.

Ethyl formate, which is manufactured by U.S.I., is a product of varied uses. It attracted attention early last year as one of the basic organic substances employed in the commercial synthesis of crystalline vitamin B_1.

It has been employed as a fumigant and larvacide, in flavoring and perfume bases, as well as in the manufacture of certain drug products. Some ethyl formate is used as a solvent for cellulose esters and ethers.

Rubber Anti-Oxidants

LONDON, England — Anti-Oxidants for rubber are prepared by treating 2:2:4-trimethyl-1:2 dihydroquinoline (or the crude mixture obtained by the interaction of aniline and acetone) with an aqueous solution of a chloride, bromide or iodide of zinc, aluminum or iron, according to a patent issued here.

Proves Butyl Acetate Vapors Are Non-toxic

TURIN, Italy—Evidence tending to support the non-toxic properties of butyl acetate vapors has been uncovered in experiments just completed here. Guinea pigs exposed to a concentration of 22 mg. per liter of butyl acetate in air developed no noticeable symptoms nor changes in the blood picture, a report states.

New U.S.I. Name Indicates Diversity of Activities

(Continued from preceding page)

dustrial Alcohol Co. was the pioneer manufacturer of industrial alcohol in this country.

In 1917 U. S. Industrial Chemical Co., Inc., was organized by U.S.I. and immediately entered into the manufacture of acetic acid, acetone, methyl acetate, ethylene, ether and numerous other alcohol derivatives urgently required in the World War by Allied Governments and later by the United States. Today, the U.S.I. organization is the largest manufacturer of industrial alcohol and is also a major producer of chemicals and solvents derived from alcohol.

The most recent major step in widening the chemical activities of U.S.I. was its entry into the resin business. Early in 1938 it acquired the business of Robert Rauh, Inc., a leading manufacturer of synthetic resins, including modified and pure phenolics, alkyds, urea-formaldehydes and ester gums. Later in the same year, U.S.I. acquired Stroock & Wittenberg Corporation, well-known importers of natural resins and distributors of synthetic resins. All of U.S.I.'s resin activities are now conducted by Stroock & Wittenberg Corporation.

U. S. Industrial Chemicals, Inc., is beginning the manufacture of cellulose acetate at a new plant constructed for this purpose at Baltimore, Md.

Effective Anti-oxidant

WILMINGTON, Del. — Aliphatic alcohols are effective anti-oxidants for petroleum-terpene hydrocarbon blends, an article published here in the *Hercules Chemist* states. As little as 1% of ethyl alcohol by volume is protection for a period of about five months, and, unlike some anti-oxidants, will not cause discoloration, it is claimed.

TECHNICAL DEVELOPMENTS

Further information on these items may be obtained by writing to U.S.I.

Rubber latex combined with granulated cork and selected fillers is now available for use as a flooring material for steel, concrete, masonry or wood composition surfaces. Applied with a trowel, it forms a resilient, non-slippery surface that resists wear and reduces noise, according to the manufacturer. **(No. 170)**

U S I

Two new flameproofing materials for textiles, paper and paper products, do not cause stiffening or yellowing or otherwise adversely affect the handle or appearance, the manufacturer announces. Superior penetration and after-glow prevention, as well as greater efficiency on a weight basis, are claimed. **(No. 171)**

U S I

Removal and re-use without marking the surface is claimed for labels backed with a new non-drying gum said to adhere instantly, without moistening, to fabrics and smooth, non-porous surfaces such as glass, metal, plastics, etc. The labels will withstand exposure to the sun and are non-corrosive, the manufacturer claims. **(No. 172)**

U S I

Ready-mixed aluminum paint which does not skin over when the open container is exposed to air has been introduced, according to an announcement. The aluminum flakes have been made practically non-settling by a special treatment, the manufacturer claims. **(No. 173)**

U S I

A new preservative designed to replace benzoic acid, sodium benzoate or salicylic acid is said to be more effective in acid, alkaline or neutral conditions. It is described as a white, odorless, stable, non-toxic powder readily soluble in alcohol and in water. **(No. 174)**

U S I

Galvanized surfaces can be painted without paint peeling off if they have been previously treated with a new metal cleaner, an announcement states. The material is said to form a zinc phosphate film on the metal. **(No. 175)**

U S I

A new latex adhesive claimed to be effective on waxed and greasy surfaces is now available. Companion products include a quick-setting and nearly colorless waterproof cement with excellent aging qualities for rough surfaces and other varieties for smooth surfaces and protective and waterproof coatings, according to the manufacturer. **(No. 176)**

U S I

Rapid and accurate weighing in milligrams is possible with a new direct-reading torsion balance, according to the manufacturer. Balances with scales ranging from 0 to 3 milligrams and 0 to 2,000 milligrams are reported available. **(No. 177)**

U S I

A new motor-driven laboratory mill has a hand-operated screw feeder and five sizes of perforated screens, the manufacturer announces. The hammer action is said to give particles closely simulating those from large, commercial pulverizers. **(No. 178)**

Expressed in terms of chemical composition, the limits given in Table IV correspond to the following alkali contents:

Li_2O	Max. 2.5%	Min. 1.1%
Na_2O	" 5.1	" 3.2
K_2O	" 6.2	" 3.2

When spodumene is incorporated in a whiteware body an expansion frequently occurs on firing. For example, a typical feldspar body had a shrinkage of 8.85 per cent. on firing, whereas a whiteware body containing the same proportions of spodumene had an expansion of 4.97 per cent. when fired at the same temperature. It is conceivable that this expansion due to the incorporation of spodumene would prove extremely useful in the overcoming of production difficulties with certain whiteware bodies and is worthy of further investigation. The extent of the expansion could be controlled by the amount of spodumene included in the batch.

The lithium mineral which exerts the most powerful fluxing effect is lepidolite, and it is on this account that it is largely used in glass melting in the manufacture of opal and heat-resisting glasses. The fluxing properties of this mineral are due to the high percentages of potash and fluorine which it contains in addition to the lithia. A typical analysis of lepidolite is as follows:[20]

Li_2O	4.65%	MgO	0.31%
K_2O	10.33	CaO	0.92
Na_2O	0.13	MnO_2	0.59
SiO_2	52.89	F	3.68
Al_2O_3	26.77	Ignition loss	0.66
Fe_2O_3 FeO	0.19		

Lithium Chemicals

The impurities present and the variation in composition of natural lithium minerals has led to the use of chemically prepared lithium salts of which by far the most important is lithium carbonate. By this means products of greater purity are obtained free from the objectionable coloring oxides of iron and manganese, at a cost not greatly exceeding that when using natural minerals. One part of lithium carbonate is chemically equivalent to about ten parts of an ore containing 4 per cent. Li_2O, and is thus equivalent to about five parts of the best amblygonite.

When such chemically prepared salts as the carbonate are employed the maximum benefits are observed in the introduction of lithium oxide. Other salts of commercial importance are the fluoride, nitrate, and chloride.

Although the use of lithium chloride as an air desiccant is of relatively recent development, the remarkable hygroscopic properties of this salt have been known for more than fifty years. The bromide also is used for this purpose. The application of these halide salts for air conditioning involves regenerative principles so that a comparatively small quantity of lithium chloride or bromide or both, together with similar hygroscopic halides such as calcium chloride, in the form of a highly concentrated solution, is capable of dehydrating a very great volume of air. Possibilities of the development of these processes lie in their possible application to the rapid drying of many commercial products such as gelatine, leather, and photographic film.[21]

The Use of Lithium Salts in Ceramics

The additions of one per cent. or so of lithium carbonate to dinnerware and sanitary ware glazes have been found beneficial in increasing the gloss, while in electrical porcelain it is of value in producing a glaze of high strength and resistance to weathering.

Due to its strong fluxing properties the use of from 9 to 12 per cent. of lithium carbonate permits the amounts of alumina, calcium and silica which may be used in a raw alkaline glaze to be increased considerably with the result that a more stable glaze is produced. Such glazes may still be sufficiently alkaline to produce the beautiful and vivid copper blues and other typical alkaline glaze colors.[22]

In the production of chinaware glazes the addition of 0.5 per cent. Li_2O gives a decided improvement in the fluidity and surface tension of the glaze, producing greater uniformity, eliminating pinholes to a large degree, and giving an increased gloss. In many leadless glazes lithium carbonate is used with advantage. Lead oxide, which also gives a high gloss, volatilizes and reacts with the kiln refractories forming a viscous skin which accumulates to such an extent that ultimately it drops on the ware passing through the kiln. The effects of the volatility of lead oxide in such commercial operations were reported by W. Thomason[23] in 1904. He found that leadless glazed ware increased in weight when fired in saggers washed with a lead glaze, in one case amounting to as much as 5.49 per cent. of the weight of the glaze. Subsequent analyses showed the presence of 6.53 per cent. PbO in the glaze on the ware, the leadless glaze having absorbed this quantity of PbO vapor from the lead glaze of the sagger. Together with W. E. S. Turner[24] the present writer has found that a lead silicate containing 53.94 per cent. PbO when heated at 1200° C. loses lead oxide at the rate of 20 grams per square meter of exposed surface per hour, 11 grams at 1100°, and 2 grams at 1000°.

These ill effects are avoided if the lead oxide of the glaze be replaced by lithium oxide, quite apart from the increased benefits to the health of the worker obtained by so doing.

In those ceramic formulae containing fluorine as a constituent lithium fluoride may be employed in place of the carbonate.

The Use of Lithium Salts in Glass Technology

The first glasses containing lithium oxide as a constituent were probably melted by O. Schott[25] in 1882 who made glasses consisting solely of SiO_2, Na_2O and Li_2O. Although Schott's results in the preparation of optical glasses containing lithium were largely negative, glass technology now takes advantage of the peculiar properties of lithium in a manner analogous to the uses of lithium in ceramics. For example, patents have been granted to W. C. Taylor of the Corning Glass Works[26] for the use of a soft glass containing lithium and barium oxides to replace the high lead oxide-containing glasses used for electric lamp stems and tubing. The hardening effect of barium oxide, which is less expensive than red lead, is counteracted by the increased softening due to the use of lithium oxide.

Lepidolite is frequently used as a constituent of glass batches when it is desired to introduce lithia, alumina, and fluorine into the glass. Lithium oxide-containing glasses are much more fluid in the molten state than glasses containing proportionate amounts of sodium or potassium, and the successful use of lithia in glass making lies in the fact that much smaller amounts are required to produce a glass of the necessary fluidity for working, with the desired physical and chemical properties, than is the case with soda or potash.

The incorporation of lithia in glass compositions is covered by patent specifications to some extent, and involves a wide range of purposes. A patent has been granted to H. P. Hood,[27] also of Corning Glass Works, for a low expansion glass containing lithia, intended for making large telescope mirrors and other massive articles, containing 75-87 per cent. SiO_2, 0.5-2.5 per cent. alkalies of which the lithia content does not exceed one third.

An interesting use of lithium products in glass manufacture is the etching effect produced by the attack of molten lithium nitrate on glass. When molten lithium nitrate at 500° F., or above, comes into contact with glass for a period of about four minutes the result is a pleasing etched appearance on the glass comparable to that obtained by fluoride frosting. O. J. Stewart and D. W. Young,[28] among others, have shown that such immersion of a soda glass in $LiNO_3$ causes replacement of some of the sodium atoms in the glass by lithium, and that the etching effect produced is due to an infinite number of minute cracks covering the glass surface. These cracks are so tiny that they have only a slight effect on the strength of the article.

Glasses of high lithia content also possess greater transmission of ultra-violet light than those containing soda or potash, a

property which could be utilized with advantage when the cost of working lithium-bearing minerals has been so reduced by modern methods of extraction and preparation to encourage their wider use and fuller exploitation of the many advantages which they are capable of conferring both in the ceramic and glass industries.

Acknowledgement

The writer desires to acknowledge his great indebtedness to G. H. Chambers, Vice-President, Foote Mineral Co., for information which he has placed unreservedly at the writer's disposal.

References

(3) See for example, T. W. Richards, *J. Amer. Chem. Soc.*, 1910, *32*, 4.
(4) J. T. Howarth and W. E. S. Turner, *J. Soc. Glass Tech.*, 1930, *14*, 394.
(5) The values for lithium carbonate are taken from J. Johnston, *Z. physikal. Chem.*, 1908, *62*, 330.
(6) The values for potassium carbonate are taken from work by P. Lebeau, *Compt. rend.*, 1903, *137*, 1255.
(7) *J. Phys. Chem.*, 1930, *34*, 2641.
(8) See for example E. Preston and W. E. S. Turner, *J. Soc. Glass Tech.*, 1934, *18*, 143.
(9) R. C. Wallace, *Z. anorg. Chem.*, 1909, *63*, 20.
(10) R. Schwarz and A. Haacke, *Z. anorg. Chem.*, 1921, *115*, 94.
(11) R. C. Wallace, *Z. anorg. Chem.*, 1909, *63*, 27.
(12) *Z. anorg. Chem.*, 1911, *69*, 142.
(13) R. Schwarz and A. Haacke, *Z. anorg. Chem.*, 1921, *115*, 87.
(14) *J. Amer. Ceram. Soc.*, 1938, *21*, 98.
(15) *Glastech. Ber.*, 1937, *15*, 335, 371, and 403.
(16) *J. Amer. Ceram. Soc.*, 1938, *21*, 189.
(17) G. C. Betz, loc. cit.
(18) J. E. Boyd, see following footnote.
(19) Paper presented at the 40th Annual Meeting of the American Ceramic Society. Unfortunately this important paper has not yet appeared in print. When it does appear the reader should consult it for the diagrams showing the relation between composition and the pyrometric cone equivalent.
(20) G. C. Betz, loc. cit.
(21) H. C. Meyer, *Ind. Eng. Chem.*, 1938, *30*, 431.
(22) Paper presented by Richardson and Baggs at the 40th Annual Meeting of the American Ceramic Society.
(23) *J. Soc. Chem. Ind.*, 1904, *23*, 469.
(24) *J. Soc. Glass Tech.*, 1935, *19*, 296.
(25) See "Jena Glass," by H. Hovestadt, translated by J. D. and A. Everett, Macmillan and Co., London, 1902.
(26) U. S. Patents 2,018,816 and 2,018,817.
(27) Brit. Patent, 446,733.
(29) *J. Amer. Chem. Soc.*, 1925, *57*, 695.

Regenerating Spent Pickling Baths

Sulfuric acid baths used for pickling metals are regenerated by adding to the spent bath a fatty alcohol soluble in aqueous media, *e.g.*, methyl and ethyl alcohol, in order to precipitate the metal sulfates, *e.g.*, those of copper or iron, dissolved in the bath. Preferably, the addition is made after cooling the bath to below 40° C. and the volume of alcohol added is about equal to the volume of the bath to be regenerated. The process is also claimed to be applicable to the separation of sulfates from a mixture of sulfuric and hydrochloric acids. (E. P. 491, 640, mentioned in *Chemical Trade Journal*, Dec. 9, '38, p. 552.)

Month's New Dyes

General Dyestuff announces the following additions to its line of dyestuffs: Celliton Fast Dark Green B which produces popular bottle green shades of good fastness to light, rubbing and hot pressing. Naphtamine Brown BTL, which is recommended particularly for hosiery dyeing, is claimed to dye mixed fabrics of cotton and rayon or spun rayon a very uniform shade. Celliton Fast Dark Brown B produces very deep brown shades of good fastness to light on acetate rayon. It shows excellent affinity and levels very well. Benzo Fast Copper Blue FBL produces an exceptionally clear, bluish shade on cotton or rayon. Shade is very fast to light and shows very good fastness to water. Product levels very well and produces tone-in-tone effects on mixed fibres or cotton and rayon; it is also easily dischargeable.

Silver as a Fungicide

A solution of ⅔ of a gram (¼ oz.) of silver nitrate dissolved in 100 gals. of water is said to make an excellent fungicide—one part of silver preventing the germination of a million spores. Scientists at Cornell University, who made this discovery (noted in *Chemical Topics* published by Merrimac Division of Monsanto), report that silver combined with soap prevents mildew on rose leaves.

Unusual Metal

Colalloy, a non-ferrous silvery metal, two-thirds lighter than steel and most common metals, unusually resistant to corrosion, outstanding in electrical and thermal conductivity, strong, workable, and low in cost, is being produced by Colonial Alloys Co., E. Somerset, Trenton Ave., and Martha St., Phila., Pa. Free laboratory testing samples can be had by request, as well as technical information and specific data for individual uses. It is said to lend itself to common fabrication practices with standard tools and equipment, and its applications are legion.

Sodium Bicarbonate Field Reported

The Smithsonian Institute, Washington, D. C., reports that sodium bicarbonate has been found in a natural state far under an ancient California lake bed. It ventured no opinion as to whether the newly-discovered deposits could be mined commercially.

Dust Palliative from Sulfite Liquor

The Finnish Administration of Highways and Waterways will continue its dust-laying experiments with the calcium salt of lignosulfonic acid on a larger scale in '39. Although final results are not yet available, experiments with this product are evidently considered sufficiently satisfactory to justify further trial. The principal constituent of the product is the calcium salt of lignosulfonic acid. It is obtained as a very diluted solution ("sulfite waste liquor") in the manufacture of sulfite pulp. The use of this dilute liquor, however, in most cases has been uneconomical due to the high water content. Enzo-Gutzeit O/Y, pulp producers in East Finland, have been experimenting with the crude liquor and have derived a concentrate with 50 per cent. solids and also a dry material in powder form. (American Consulate, Helsinki).

Bearing Alloy

A bearing metal alloy which contains 70 per cent. Cu and 30 per cent. Pb, with no tin content, is offered by Fredericksen Co., Saginaw, Mich. The total percentage of impurities is claimed to be less than 0.2 per cent. Laboratory tests are said to show that these bearings will withstand more than 3,500 lbs. per sq. in. pressure on the projected area of 900 ft. per min. running speed. A distinctive feature is claimed to be the fine distribution of lead through the copper matrix, the alloy having a hardness of 22 Brinell, using a 500-kg. ball.

Pyridine in Wool Scouring

Wool, sheepskins, and like animal fibres are cleaned by an aqueous scouring liquid containing pyridine or a homologue or derivative thereof, ammonia, and an emulsifier such as soap and/or soda ash. Fatty matter not emulsified may be removed from the scouring liquid by a centrifuge, a skimmer, or by other mechanical means. Additions of pyridine, ammonia, and emulsifier may be made to the scouring liquid periodically. Suitably, the wool is passed through 3 bowls containing respectively: (1) 2 lb. soda ash, 6 lb. of soap, 1 gallon of 0.880 ammonia, 150 cc. of commercial pyridine, and 1,500 gallons of water at 100—120°F.; (2) 1 lb. of soda ash, 3 lb. of soap, 0.5 gallon of 0.880 ammonia, 75 cc. of pyridine, and 650 gallons of water at 80—100° F.; (3) rinsing water at 70—80° F. (E. P. 482,748, given in *Chemical Trade Journal*, July 22, '38, p. 85.)

Chemical Specialties for Industry

A digest of new uses and new compounds

Introducing New Products to the Consumer Market

By Jackson Hazlewood, M.E., M.M.E.

HOW to introduce a new product to the consumer market often proves quite a problem, especially if the product is designed for consumer use and the company is engaged in industrial manufacturing and selling. Assuming that the decision is made not to sell the patent or the product to a manufacturer or distributor of retail goods, the establishment of a consumer sales organization and the introduction of the product is a job best accomplished by first studying the methods of successful consumer-goods manufacturers.

In studying these methods remember that today marketing is an art—just as manufacturing was an art in the 1870's. Whereas production methods are today definitely established along lines which permit predetermination of factory costs down to the last one hundredth of a cent, marketing methods are just beginning to reach a stage where the past experience and costly mistakes of pioneers in the field can be studied to advantage. That the consumer cost of retail merchandise averages twice the factory cost is mute evidence of this condition.

Following are some broad policies to expedite the successful introduction of a consumer product.

I—Introduction Appropriation

More products have failed in returning a fair profit to the manufacturer by having been introduced with too great an introduction appropriation than with too small a one. Not only does a splurge at introduction often result in a wave of acceptance so spontaneous and so great that unsurmountable production and distribution problems result, but also the cost of that first introduction campaign frequently leaves a burden which eats up normal profits on the product for years.

II—The Choice of Retail Price

Conversely, more products have failed because they were introduced at too low a consumer price than too high. This is caused by one of two reasons: the low price first set is insufficient in the light of subsequent experience (it is always easier to lower an established price than to raise it); or the invitingly low price, even if it provides sufficient profit, results in such a volume of sales that alert competitors enter the field with an aggressiveness which overcrowds the market.

III—Scope of Introduction

Over-ambitious plans regarding the scope of introduction are a frequent cause of the failure of a product. An adequate test campaign should be conducted in a specific small area before anything even approaching national distribution is sought. Thus costly mistakes can be caught and rectified before great harm is done.

IV—The Maintenance of Product Independence

The policy of causing the profits of a successfully established product to suffer in the introduction of a new product is never wise. It can cause failure for both. In practice, declining profits from one established product are seldom bolstered by the diversion of profits from another established product. Rather, the failing product is usually abandoned. Such a procedure is even more important if the product is new. Past experience gained in marketing the failing established product may dictate its continuation for a variety of reasons—adverse effect on the market which would result from its withdrawal, loss of patent-rights, indication of subsequent renewed vitality, loss of important sales-outlets, etc. If such reasons fail to justify the marketing of an established but losing item, certainly a new, untried item should not be granted extraordinary assistance in the form of diverted profits.

Having these broad policies in mind, next consider the specific marketing principles and methods based upon them. These are treated briefly, below, in the sequence in which the policies involved were stated above.

I—Determination of Introduction Appropriation

The first consideration is: what can be expected to be first year's gross business. This involves a study of both manufacturing and marketing facilities. Whichever limits gross business must then be used as a basis for determining the appropriation necessary.

Knowing factory cost, the marketing costs must be carefully estimated and added to it. The required profit is then stated in terms of a percentage of the resultant figure. A good tentative selection for this is 13½%. Certainly it should fall within limits of 9% and 18%. This percentage is in reality a statement of return on investment or capital employed. Profit stated in terms of sales income is relative; in terms of investment it is absolute and should be a constant.

To arrive at a figure for the final cost, composed of the factory cost and the marketing cost, the following elements must be estimated and added to the factory cost, already definitely known:

1. Reserve for expansion, major repairs and replacements of production equipment (if not already figured into factory cost).
2. Normal sales and administrative expense for the new product.
3. Normal advertising expense for the new product.
4. Normal distribution expense of the new product; composed of packaging, warehousing, shipping and transportation costs.

From the sum of the estimate of these four plus the factory cost of the anticipated first year's gross sale a dollar value of the anticipated first-year profit can then be determined. From it the amount available to repay the introduction appropriation is then apparent and an appropriation equal to this amount should be made. This is in accordance with the fourth policy; making each product pay its own way. As the product prospers by its own merits, the additional profits it returns can then be reverted for its further promotion. The procedure then becomes in reality a succession of introductions of the product to new market-areas, the cost of each new campaign being paid out of the profits of the last.

II—Choosing the Retail Price

This problem must be approached from two viewpoints simultaneously. These involve the questions of size and style of

package and optimum selection of consumer price from the standpoint of its influence on purchase.

Size and style of package are governed in large measure by the nature of the product. Such factors as its hygroscopic properties; its behavior under conditions of heat, sunlight, and aridity; its deterioration with age; and the production facilities for its packaging enter in. A thorough analysis of each of these must be made—a study involving both laboratory and sales research.

The second, the optimum section of a consumer price best suited to the market, is one of sales psychology and sales research. If possible, the experience of competitors in marketing the same or similar products, or products designed for the same purpose, are assets upon which to capitalize.

The package should not be too small. Once purchased, on a trial, the product becomes a mere sample, easily discarded in favor of its predecessor or a substitute, if it is so small as to provide a quantity sufficient for use on only one occasion. Too large a package, on the other hand, usually necessitates a consumer cost so high as to inhibit these initial trial purchases—and a trial purchase is infinitely more successful as an ultimate sales-builder than a free sample. Too large a package may also cause antipathy on the part of the retail merchant toward stocking an item which ties up his capital over the long periods of time necessary between consumer purchases, if the product is a repeat item. His turnover, which determines his profit, is fixed by the period necessary for normal consumption of the package, once its usage and acceptance is established with the consumer.

Package design is quite apart from the size and style of package. Once the limiting factors of size and style have been determined, the design of the package is the final step in the preparation of the product for introduction.

Although very definitely influenced by the size and type of the package, design is best handled by a competent advertising expert—one who has full knowledge of "package-appeal" which is dependent upon psychological reactions in the mind of the purchaser. A pleasing appearance results from the design which is drawn up to include the suggestion of simplicity and quality in the product and a color combination which is harmonious and pleasing and, if possible, suggestive of the use of the product. But in addition the design must give full consideration to the problem of insuring that the package will be given a place by the retailer where it can command the attention of the consumer. The advertising expert knows how to design the package to obtain the maximum display value from the shelf or counter space which the retailer can be expected to devote to it. This means that a color which does not fade or deteriorate under the action of fly-specks, moisture, etc., must be selected because the retailer is intent upon maintaining the quality appearance of his merchandise, and he will insist that the product receive no more space in his establishment than its share of his profits justifies.

III—Determining the Scope of the Introduction Campaign

The scope of introduction will be limited naturally by the sum available for this purpose. How best to utilize this fund is a problem of sales and advertising—and, in one sense, of production. One market should be developed at a time, and the measure of success in it will then determine the additional marketing areas to be developed and the speed with which they are opened up. Production is a question of physical limitations. Early demand for the product must not exceed plant capacity for manufacturing without expensive and time-consuming alterations or additions. The area selected should be one upon which the geographic limitations of its economical and speedy accessibility with respect to the factory do not place too great a handicap.

From a sales standpoint the area should be representative—one where seasonal or economic factors influencing purchasing power do not play too large a part and where taxes and trade laws or agreements are average. Thus, the experience gained in introduction to this area can be fairly utilized in other sections. Also, from a sales standpoint, the area should be one in which normal dealer relationships exist and lastly, the area should be one adequately and efficiently manned by a sales force competent to do the job, or capable of any necessary sales training at a minimum of expense.

From an advertising standpoint the area should present no problems which call for an abnormal expenditure. Further, it should be an area whose market-structure is sufficiently autonomous that the influence of neighboring or larger metropolitan marketing areas is negligible. If the sales potential of the area defined by the consideration of production capacity is such that the population of this initial campaign area is greater than twenty-five thousand, a separate test campaign of a week's duration should be made in an independent marketing area of about that size. Such a test town should possess its own local newspaper, read almost to exclusion by its citizens; and their purchases should be made substantially in that town. Valuable information is to be derived from such a test and it assumes the importance of an initial introduction area, although the profits of this one-week test cannot be expected to support the introductory campaign in the larger area selected for the first year's sales effort.

IV—Maintaining Product Independence

Having already determined the sum available for introduction, the size, type and design of package, and the quantity available for sale, as well as the area in which it is to be sold, the final question to be answered is, "How is the market to be established." In other words, how is a consumer demand for the new product to be created?

The methods employed by successful manufacturers of retail goods include the following:

1. Door to door or point-of-purchase sampling.
2. "Factory-packs" with established products.
3. Premium offers and reduced-price sales.
4. Cooperative campaigns with the manufacturer of a companion product which has an established market.
5. An intensified advertising campaign embracing radio, newspaper, magazine and display effort.
6. Prize contests or other "write-to-the-manufacturer" promotions.

Of these six methods some are unsuited for the purposes of a limited introductory campaign such as has been outlined. The merits as well as the disadvantages of each will be given briefly.

1. Direct sampling is one of the most expensive and, in many ways, one of the most unsatisfactory. In sampling possible users indiscriminately a tremendous waste is involved. No way of eliminating consumers unable to make purchase of the product, non-consumers, confirmed users of a competitive product, or free-merchandise grafters has been found. Further, if the product has any considerable value the sum involved in a mass free-distribution is prohibitive. If an attempt is made to reduce this sum by reducing the size of the sample, packaging a special trial-quantity not only means the added expense of this special size package but frequently defeats its own purpose by offering a quantity of the product to the individual consumer so small that no fair trial, preference habit, or consumption demand can be built up.
2. Factory-packs with established products of the same manufacturer are dangerous tools, since the practice involves a violation of the policy of product-independence. Unless the companion product is so well established in its field that it will be demanded by the customer in spite of the new product, the risk of destroying the prestige of the established product is encountered. Few products are so firmly entrenched.
3. Premium offers and reduced-price sales are somewhat better suited to the purpose since such campaigns usually can (and

rightfully do) receive merchandising effort and display space from the retailer. Such promotions should be backed up by adequate local advertising. Caution must be exercised in the selection of merchandise premium articles—for they must possess not only a definite proved appeal to the consumer but must be of an unimpeachable quality which could not cheapen the new product by association with it. Such premium merchandise preferably will be an associated item and one which violates no religious, political, mental or moral scruple of the consumer for whom the new product is designed. A safer plan of sidestepping such considerations is the special reduced price sale as exemplified by the familiar "one-cent sale." This special price must be so defined as to maintain the established price structure on the product and the impression of quality in the mind of the consumer.

4. Cooperative campaigns with the manufacturer of an established companion product are perhaps the most satisfactory for the purpose, provided an interested manufacturer can be found. In return for the prestige to be gained, with both the consumer and the retailer by association with such a product, the new product offers to such a manufacturer the increased sales appeal, cooperative advertising, and displays which will result from the advertising campaign of the manufacturer of the new product. That these advantages have very definite appeal to some established manufacturers as a method of increasing their sales is evidenced by the fact that they will often supply the necessary merchandise free in return for the advertising they expect to get.
5. An intensified advertising campaign is frequently too expensive to be practicable—and in most cases two of the media, radio and magazines, are eliminated by the geographical limitations of the test. However, a modest campaign of intensified local newspaper and merchandising display effort frequently bears fruit in a measure which more than justifies the expenditure.
6. Prize-contests and other write-in campaigns such as free-sample-coupons are quite successful for national distribution but their very success has made them dangerously over-popular with manufacturers. The result has been that in the race to gain consumer attention the cost has risen steadily. In any case, the cost for a local campaign of this nature will in most cases automatically eliminate it.

A summary of the four underlying policies to be considered in the introduction of a new product to the consumer market: Proceed carefully and with planned conservative expenditures, building a market for the future without jeopardizing existing markets and without attempting to revolutionize the industry at the start.

Powdered Wetting Agents

Detergents or wetting-agents consisting of a liquid or non-solid organic substitute for soap, are mixed with the melt of a water-soluble inorganic acid containing water of crystallization, at a temperature above the transition point, and then the mixture is cooled with stirring or is sprayed. Crystalline sodium sulfate, perborate, pyrophosphate or metaphosphate is heated above the transition point, and after withdrawing some of the aqueous layer if desired, the condensation product of ethylene oxide with octadecyl alcohol or isoacetyl phenol is added. The mixture is then stirred vigorously and cooled, or is sprayed to form a powder, which may be formed into flakes, bars or cakes. Samples are furnished under Section 2 (5) of granular or powdered products prepared from (1) sodium sulfate and the condensation product of oleic acid with methyl taurine, (2) sodium sulfate and the sulfonated condensation product of ethylene oxide with a mixture of hexylene phenol and heptylene phenol, (3) sodium pyrophosphate and turkey-red oil. E. P. 490,285, mentioned in *Chemical Trade Journal*, Nov. 4, '38.

New Metallic Soap

A new metallic soap, known as Metasap 571, for use on fibrous materials, has been announced by Metasap Chemical Co., Harrison, N. J. New powder is designed to yield high concentrations of aluminum stearate in solvents and oils, in water-thin solutions which can be further diluted with almost any thinner such as toluol, varsol, ethyl acetate, Stoddard solvent, etc. Brushed or sprayed on brick, stone, cement, stucco, wallboard, etc., it provides excellent waterproofing as maximum penetration is obtained due to the viscosity of the product. This is also true for use on textiles, paper, and fiberboard. Product has found use in waterproofing flower boxes and in preparation of an efficient wall sealer.

Pigment for Flat Paints

A pigment for flat paints, which imparts high opacity and a low sheen, known as "Ti-Cal TC," is announced by Krebs Pigment & Color Corp. It is a high oil absorption, thick consistency pigment of the type needed for full-bodied, highly opaque flat paints, responding moderately to the addition of water, giving fullness and easy working under the brush without excessive bodying, and producing extra hiding power in flat paint films.

Rust Preventative

Dens-Ox-Cide, a thin liquid material for use in covering rusted surfaces likely to become rusty (interior or exterior) to prevent further rusting, is a product of Densol Paint Co., South Park, Ohio. In addition to its rust-preventative qualities, Dens-Ox-Cide possesses exceptional heat-resisting qualities which make it adaptable for exterior exposures such as on metal stacks where maximum elasticity of the coating is required to meet sudden and drastic changes in the temperature of the surface to which it is applied. It is also an unusual vehicle for aluminum powder and for thinning red lead paste.

Water Repellent Finish

A new durable repellent finish, named "Zelan," which produces on fabrics a durable water-repellent finish which will last through repeated launderings and dry cleanings, is announced by du Pont. Tests have shown that its repellency properties remain for a much longer period of time than in water repellent specialties of other types. (See photographs, page 60.)

New Aniline Inks

Aniline inks for three types of application are being made by International Printing Ink, 75 Varick St., New York City. Employing distinctive formulations, the inks are said to offer decided advantages over the old type of aniline printing materials, to be extremely fast to light, and resistant to water bleed. They dry almost instantly on paper at high web speeds and run clean on the press. One is designed for use on kraft or white paper. It is very fast to sunlight. There is no bleeding in water, or with most oils, fats, and waxes. Another type has been formulated for transparent aniline printing. They will maintain good color, resisting fading and deterioration. A third aniline ink is adaptable to printing on Cellophane stock. Thoroughly opaque, this line comes in all colors and with gloss.

Vulcanizing Agent

A vulcanizing agent, called Selenac, which is said to be effective in the absence of added sulfur, has been added to the line of rubber chemicals featured by R. T. Vanderbilt Co., 230 Park Ave., New York City. New agent is an odorless, golden yellow powder of 1.3 sp. gr. and melting point of approximately 93°C.

New Lubricant

A product for lubricating moving parts of such delicately adjusted mechanisms as are found, for instance, in orifice type flow-meters, seems to hold considerable promise in fields where "permanent" type lubrication must be combined with pressure sealing, fluid proofing, and temperature-resisting properties. Described by the manufacturer, Acheson Colloids Corp., Port Huron, Mich., as a castor oil dispersion of colloidal graphite, it may be in turn dispersed also in light greases or blended with low freezing point fluids, to meet either high or low temperature lubrication requirements. The colloidal graphite itself is of the type known for its use as a dry lubricant, the particles of graphite being so fine as to pass right through filter paper in "solution." It is this fineness, apparently, which produces a "graphoid" dry lubricant coating on friction parts, reducing wear and protecting against corrosion.

Carpet Dye

A special carpet dye, offered hotels and restaurants, is claimed by manufacturer to completely restore or change the color of carpets at a saving of more than 90 per cent. of replacement cost. With this dye, a tub, pail and scrub brush are the only equipment required. The dye is applied while the carpet is still on the floor. Company has offered to make a free test for those interested. It is manufactured in 30 standard colors, according to *Hotel Management*, Oct., '38, p. 110.

New Industrial Finish

A pyroxylin undercoat for automotive refinishing, designed especially for use under Automotive "Pyralux," is announced by du Pont. Purpose of new coating is to prevent "sinking in" and to obtain a uniform gloss. It is light gray in color and is packaged in quarts, gallons and five gallon cans. Automotive "Pyralux" is a finish recently developed by du Pont expressly for touching up work and recoloring used cars.

Liquid Soldering Flux

"Special X" is the trade name of a new liquid soldering flux particularly intended for "difficult to solder applications." It can be used on brass, copper, cadmium, stainless steels, zinc, monel, iron and other alloys, according to maker, Industrial Service Labs., 915 W. Okla. Ave., Milwaukee, Wis. Research was particularly undertaken to provide a better flux for builders and fabricators of alloy steel and monel equipment, but results prove that it works unusually well in production or "line" soldering of toys, expansion valves, electrical controls, small pressure tanks, restaurant equipment, lighting fixtures, etc. Lowered surface tension and good wetting power of the flux cause quick and uniform flow of solder into all cracks and crevices. Manufacturer will supply working sample and technical data upon receipt of request on company letterhead.

Product for Cleaning Blinds

"Blind-X" is described as a "once over, one cloth" cleaner for Venetian blinds which eliminates the customary drying and polishing processes, according to manufacturer, Blind-X Co., Minneapolis, Minn.

Paints for Wet Surfaces

A line of paints which are guaranteed to adhere to wet as well as dry surfaces and provide equal protection, said to be of particular interest in the water and sewage fields, has been developed by Wet-X-Hale Paint Co., 16 Moore St., New York City. The feature of Wet-X-Hale paints and varnishes are the materials blended in to absorb moisture during paint application. Being lighter than the paint the resultant hydrated compounds appear on the paint surface and evaporate. Upon drying (or setting) the W.X.H. paint film becomes impervious to moisture and no blistering is experienced. These interesting paints are offered for wood, concrete or metal surfaces.

Textile Foaming Agents

Oxalic acid or a salt thereof is reacted with a quaternary ammonium salt having the formula $ROCH_2N$(tert.)X, wherein R stands for an aliphatic hydrocarbon radicle with at least 16 carbon atoms; N(tert.) stands for a pyridine, C-alkyl-pyridine or quinoline nucleus, and X stands for an acid radicle other than that of oxalic acid. In examples, oxalates are formed from the following pyridinium salts: (1) cetyl and (octadecyl) oxymethylpyridiniumsulfite—prepared by passing sulfur dioxide into a heated mixture of cetyl or octadecyl alcohol, paraformaldehyde and pyridine; (2) a mixture of cetyloxy- and octadecyloxymethylpyridinium chloride prepared from technical stearyl alcohol. The use of eikosyl, ceryl and melissyl alcohols, picolines and lutidines is mentioned. Resulting products are foaming agents, and may be used in the textile industry. Basis of E. P. 488,869, referred to in *Chemical Trade Journal*, Nov. 4, '38, p. 428. E. P. 475,119 is referred to.

All-purpose Label Adhesive

To meet the long-standing need for an adhesive capable of adhering to practically any surface, Paisley Products, Inc., 1770 Canalport Ave., Chicago, announces its new product, Grip-Tite Label Paste. New adhesive has been perfected to make available to label users a paste which can be relied upon to hold dependably to practically any surface under almost any condition of temperature, atmosphere or climate on plain, lacquered and lithographed surfaces of tin, iron, copper, brass, lead, aluminum, stainless steel, Bakelite, hard rubber, tile, leather, wood (either painted, unpainted or varnished), paper board, porcelain, glassware, galvanized ware, plastics, etc. Testing sample is available to anyone writing on their own letterhead.

Porcelain Enamel Finish

A porcelain enamel finish, known as "Silverflake" has been made available by Chicago Vitreous Enamel Products Co., Cicero, Ill. New finish is merely a ground coat over-sprayed with a "silver flake" liquid. A single labor application and a single firing is all that is necessary to provide a genuine porcelain enamel finish at a very low unit cost, it is claimed. The finish is much easier to keep clean than "crackle" type finishes.

Paint Formulation

Paints for use in or near chemical plants (such as gasworks, smelters and manufacturing factories) require special formulation. Where structural materials are exposed to sulfur dioxide, carbon monoxide, carbon dioxide, hydrogen sulfide, ammonia, water vapor, benzine vapor and other active gases, and to flue dust or various industrial dusts, they must be compounded for rapid drying (to avoid dust damage) and high resistance to chemicals. Blown linseed oil, alkyd resins, tung oil, chlorinated rubber, benzyl cellulose, vinyl resins and phenolic resins are among the types which should be considered in formulating finishes of this type. Red lead, white lead, chrome yellow, chrome green, iron oxides, titanium dioxide and zinc oxide are the most useful pigments which should be considered. Some of them have the drawbacks, such as the sulfide sensitivity of lead pigments, the characteristic chalking of titanium pigments, the low acid resistance of zinc oxide pigments, etc. For paints which are subjected to severe heat exposure, aluminum bronze paints should be used. Benzyl cellulose is excellent for alkali resistance and is also quite waterproof. Vinyl resins are effective in oilproof finishes as are also the baking type varnishes made with phenolic resins. For buried or submerged articles, bituminous paints are both effective and cheap, though they are not durable when exposed to sunlight. For alternate under-water and sunlight exposure, vinyl resins are very durable. For severe temperature fluctuations, *e.g.*, in synthetic gasoline plants where the temperature ranges from 0° to 500°, a new synthetic resin varnish has recently been developed in Germany to meet this requirement. (*National Paint Bulletin*, Sept. '38, p. 9.)

POLY
370,119
Babbitt's
393,363
397,062
Standard
397,487
WHITE ROSE
398,713
ALL-WAX
TRADE MARK
CLEANS
AND
PRESERVES
— All In One Operation —
For New Car
No. 500
Contains 16 oz. Price $1.00
401,323
SUNTAN
402,819
GRIFFOLIT
403,204

RED AUTO
401,566
it's O.K.
403,091
Ladco
404,154
ORION
404,238
SANTOMERSE
404,256
Velvo
404,712

Varsity
404,866
CALVIS
405,741
KROTIOX
406,362
RUTIOX
406,363
COLUMBIA
406,632
SHAD-O BAND
407,416
GAS TINE
407,495
MACAR
408,195
GUANICO
408,867
HYGANIC
408,869

Biff
A Sure Knockout
408,390
CATHODIC
408,978
STAMCO
409,112
Stacoat
409,353
EMERY
409,464
KILL-EM
SLICK
409,473
AUXAN
409,559
DAMTITE

1-SHOT
409,725 & 409,726
7 WAY
409,851
COLUMBIA
409,863
Precious Cosmetics
409,930
Wilson's
RID-O-RAT
410,054
Wilson's
SOIL-O-GAS
410,055
R
CHEMICALS
410,087

370,119. Phillips Petroleum Co., Bartlesville, Okla.; Oct. 7, '35; petroleum greases and oils for illuminating, burning, power, fuel and lubricating purposes; use since Sept. 27, '35.
393,363. B. T. Babbitt, Inc., New York City; May 28, '37; cleanser for enamel, porcelain, glass, metal, linoleum, and wood; use since 1851.
397,062. Yale Oil Corp., Billings, Mont.; Sept. 2, '37; gasoline and lubricating oils and greases; use since Apr. 23, '37.
397,487. Standard Mailing Machines Co., Everett, Mass.; Sept. 16, '37; duplicating fluid; use since Aug. 10, '37.
398,713. Dessiedess Paint Co., New York City; Oct. 20, '37; wall paints; use since Jan., 1933.
401,323. Carl Burrell (All-Wax Products of N. J.), Irvington, N. J.; Dec. 24, '37; automobile wax and polish; use since Jan. 1, '35.
402,819. Industrial Paint & Pigment Co., Okla. City, Okla.; Feb. 8, '38; paints; use since Oct. 1, '36.
403,204. Hermann Frenkel, Molkau, Germany; Feb. 19, '38; varnishes, lacquers, and similar products for wood, furniture and other articles of wood; use since Sept. 9, '38.
401,566. B. F. Goodrich Co., Akron, O.; Jan. 5, '38; top dressing, metal polish, upholstery fabric cleaner, and valve grinding compound; use since May 1, '37.
403,091. Procter & Gamble Co., Cincinnati, O., Feb. 16, '38; washing powder; use since Mar. 10, '35.
404,154. Ladd Lime & Stone Co., Cartersville, Ga.; Mar. '17, '38; mason's hydrated lime, lump lime, and pulverized quicklime; use since 1911.
404,238. Texas Co., New York City; Mar. 18, '38; lubricating oils; use since Feb 25, '38.
404,256. Monsanto Chemical Co., St. Louis, Mo.; Mar. 19, '38; washing compounds for household and industrial use; use since Jan. 28, '38.
404,712. Hi-Glo Products, New York City; Mar. 31, '38; polishing wax for all kinds of floors; use since Dec. 23, '37.
404,866. Pep Boys, Manny, Moe and Jack (Varsity Products Co.), Phila., Pa.; Apr. 4, '38; auto polish; use since Feb. 1, '38.
405,741. Standard Oil Co. of Calif., Wilmington, Del., and San Francisco, Calif.; Apr. 26, '38; liquid hydrocarbon polymers of lubricating oil type; use since Feb. 4, '38.
406,362. Titan Co. A/S, Fredrikstad, Norway; May 14, '38; paint products and paint making materials; use since Apr. 20, '38.
406,363. Titan Co A/S, Fredrikstad, Norway; May 14, '38; paint products and paint making materials; use since Apr. 20, '38.
406,632. Columbia Alkali Corp., Barberton, O.; May 23, '38; sodium bicarbonate, U. S. P., to neutralize acidity; use since Apr. 26, '38.
407,416. Barrett Co., New York City; June 13, '38; bitumen impregnated fibrous base shingles; use since June 17, '37.
407,495. Isidore W. Goldberg (Gastine Co.), Bridgeton, N. J.; June 15, '38; composition for prevention carbonization of engine-cylinders; use since Oct. 22, 1915.
408,195. McAleer Mfg. Co., Detroit, Mich.; July 5, '38; polishing and cleaning preparation for automobiles, furniture, and lacquered, varnished or enameled surfaces; use since Apr. 27, '38.
408,867. Wellesley Holdings, Ltd., London, England; July 23, '38; guano fertilizer; use since July, 1937.
408,869. Wellesley Holdings, Ltd., London, England; July 23, '38; fertilizer; use since October, 1937.
408,390. Arthur Clay Leach (Biff Mfg. Co.), Pueblo, Colo.; July 11, '38; wax for floors, polish for furniture, woodwork, etc.; use since Oct. 1, 1926.
408,978. Wood Ridge Mfg. Co., Wood Ridge, N. J.; July 27, '38; chemically pure metallic mercury for use in certain types of lamps using gases such as Neon, Argon, etc.; use since Mar., '37.
409,112. Standard Manifold Co., Chicago, Ill.; July 30, '38; duplicating fluid for liquid process duplicating machines; use since Aug. 15, '30.
409,353. Louis H. Friedman (Dry Color Paint Co.), Los Angeles, Calif.; Aug. 8, '38; paint enamel, paints, and varnishes; use since Oct. 15, '36.
409,464. Emery Industries, Inc., Cincinnati, O.; Aug. 11, '38; tar or pitch; use since 1840.
409,473. Krom Labs., Inc., Kingston, N. Y.; Aug. 11, '38; insect or fly spray; use since July 30, '35.
409,559. Chemicals, Ltd., Montreal, Que., Canada; Aug. 13, '38; plant hormone preparations for stimulating rooting of cuttings; use since Aug. 5, '38.
409,718. United American Metals Corp., Brooklyn, N. Y.; Aug. 17, '38; plastic composition used in forming soft metal bearings; use since Aug. 5, '38.
409,725. Derris, Inc., New York City; Aug. 18, '38; flushing powder for closet bowls, etc.; use since July 1, '38
409,726. Derris, Inc., New York City; Aug. 18, '38; drain pipe cleaner; use since July 1, '38.
409,851. Southern Friction Materials Co., Charlotte, N. C.; Aug. 22, '38; penetrating oil, breaking-in oil for new motors, valve freeing oil, lubricating oil for use in a spraying apparatus, and similar products; use since June 22, '38.
409,863. Columbia Alkali Corp., Barberton, O.; Aug. 23, '38; for caustic soda, soda ash, liquid chlorine, bicarbonate of soda, modified sodas, and caustic ash; use since July 25, '38.
409,930. Northmont Hosiery Corp., Reading, Pa.; Aug. 24, '38; oil for treatment of full fashioned hosiery; use since July 5, '38.
410,054. Andrew Wilson, Inc., Springfield, N. J.; Aug. 27, '38; rodent exterminator; use since Mar., 1933.
410,055. Andrew Wilson, Inc., Springfield, N. J.; Aug. 27, '38; preparation to be applied to soil for destroying insects, vermin, etc.; use since Mar., 1933.
410,087. Reichhold Chemicals, Inc., Detroit, Mich.; Aug. 29, '38; resins and resin solutions; use since July, '38.
410,227. J. & R. Motor Supply Co., Chicago, Ill.; Sept. 2, '38; anti-freeze solutions; use since Sept. 16, '35.
410,236. Parr Paint & Color Co., Cleveland, O.; Sept. 2, '38; viscid compounds for use in glazing, calking, and pointing; use since Aug. 25, '38.
410,264. Chas. McArdle, New York City; Sept. 3, '38; liquid having solvent and lubricating qualities to improve combustion in internal combustion engines; use since Aug. 22, '38.

† Trade-marks reproduced and described cover those appearing in the *U. S. Patent Gazette*, Nov. 15 to Dec. 13, inclusive.

"ESKIMO"
410,227
ZINKROLASTIC
410,286
CONTROLLED POWER HEAT ENERGY
PEPS-IT
410,264
Protectene
410,274
AHCONOL
410,422
DIC-A-DAILY
410,475
B·K
410,476 + 410,477
Zip-Glo
410,481
DINO
410,558

BAC-TROL
410,576
PARABOND
410,606
Squito-Rid
410,676
SMOOTH-ON
410,754
PENTRA
ONE - 2 - THREE
410,788
EMPESCO
410,797
Reso-Dry
410,826
Reso-Wet
410,827
NEVCO
410,843
DRYSAVE
410,859
ZOLITE
410,938
VAPOO
411,040

STA-WAY
410,975
NOILCOTE
411,054
PINO-KLEEN
411,072
PENUMUS
411,080
PENURA
411,081
ALKAZID
411,092
SANOR
411,102
OX-O-PRIME
411,125
OX-O-SPAR
411,126
PARCOLITE
411,134

Neu-Art
411,138
THESKO
411,139
21
411,141
411,142
VITALON
411,147
William Mortensen
GAMMA 'D'
411,179
BESCOUR
411,205
METONE
411,224
PHOSPHOTEX
411,233

NUACT
411,280
NUODITE
411,281
THREE LITTLE BOTTLES
THAT BUILT THE PLANT
411,282
Belvitan
411,298
LIN-BRITE
411,337
SUPRE-MACY
411,357
NEOSOLVE
411,464
FLEXFILM
411,484
MICROMET
411,489
VITRINK
411,492
PLAX
411,535
LUSTRONOL
411,582
PURGO
411,583

410,274. Sowa Labs., Inc., New York City; Sept. 3, '38; compositions for application on finished surfaces of metals, to polish and provide a transparent coating for same; use since Aug. 17, '38.

410,422. Arnold, Hoffman & Co., Providence, R. I.; Sept. 10, '38; products for use in processing textiles; use since Apr. 1, '38.

410,475. Patent Cereals Co., Geneva, N. Y.; Sept. 12, '38; household and laundry cleanser having water softening properties; use since Aug. 19, '38.

410,476. Pennsylvania Salt Mfg. Co., Phila., Pa.; Sept. 12, '38; bottle washing compound; use since Apr. 18, '38.

410,477. Pennsylvania Salt Mfg. Co., Phila., Pa.; Sept. 12, '38; general purpose washing powder and cleaner; use since Apr. 19, '38.

410,481. Pioneer Co., Louisville, Ky.; Sept. 12, '38; cleaning preparation having water softening properties; use since July 7, '37.

410,558. Sinclair Refining Co., New York City; Sept. 14, '38; cleaning and degreasing compound in powder form; use since Aug. 30, '38.

410,576. Baird & McGuire, Holbrook, Mass.; Sept. 15, '38; disinfectants, deodorants, and germicides; use since Apr. 1, '38.

410,606. Parabond Corp. of America, Boston, Mass.; Sept. 15, '38; construction materials, comprising latex compounds, for use as a structural joint; use since Apr. 1, '36.

410,676. Andrew Wilson, Inc., Springfield, N. J.; Sept. 16, '38; larvacide and repellent for mosquitoes; use since June, '37.

410,754. Smooth-On Mfg. Co., Jersey City, N. J.; Sept. 19, '38; hydraulic iron cement for waterproofing concrete, brick, stone or other porous surfaces; use since 1912.

410,788. Hegeman-MacCormack Corp.; New York City; Sept. 20, '38; wax and gum solvents, and acid and corrosion inhibitors; use since July 11, '38.

410,797. Milk Plant Specialties Corp., Rochester, N. Y.; Sept. 20, '38; for cleansing, dissolving, and sterilizing chemicals; use since Aug. 29, '38.

410,826. Behr-Manning Corp., Troy, N. Y.; Sept. 21, '38; coated abrasives; use since Aug. 24, '38.

410,827. Behr-Manning Corp., Troy, N. Y.; Sept. 21, '38; coated abrasives; use since Aug. 24, '38.

410,843. Neva-Moth Corp. of America, New York City; Sept. 21, '38; odorless mothproofing compound; use since Sept. 6, '38.

410,859. Calorider Corp., Old Greenwich, Conn., Sept. 22, '38; deliquescent material for drying air; use since Aug. 30, '38.

410,938. R. T. Vanderbilt Co., New York City; Sept. 23, '38; zoistic aplite (a ceramic lux) used in ceramic white ware; use since Sept. 20, '38.

411,040. Vapoo Products Co., New York City; Sept. 27, '38; preparation in powdered form for cleaning upholstery, shades, woodwork, painted surfaces, metal surfaces, etc.; use since Nov. 1, '32.

410,975. National Carbon Co., New York City; Sept. 22, '38; insect repellent lotion; use since June 10, '38.

411,054. E. F. Houghton & Co., Phila., Pa.; Sept. 28, '38; oil and grease resistant compound for paper; use since Sept. 16, '38.

411,072. Acme Chemical Co., Milwaukee, Wis.; Sept. 29, '38; household cleanser having properties of deodorizing and sterilizing; use since May 14, 1929.

411,080. Wm. Chesley Bowman, Jr. (Wm. Bowman Co.), Montgomery, Ala.; Sept. 29, '38; fertilizer and poultry litter; use since May 16, '38.

411,081. Wm. Chesley Bowman, Jr. (Wm. Bowman Co.), Montgomery, Ala.; Sept. 29, '38; fertilizer and poultry litter; use since May 16, '38.

411,092. I. G., Frankfort-am-Main, Germany, Sept. 29, '38; preparations for use in purifying gases; use since Mar. 13, '36.

411,102. Rochester Germicide Co., Rochester, N. Y.; Sept. 29, '38; disinfectants and deodorants; use since Aug. 1, '38.

411,125. Lehman Bros. Corp., Jersey City, N. J.; Sept. 30, '38; paints, varnishes, and paint enamels; use since Sept., '36.

411,126. Lehman Bros. Corp., Jersey City, N. J.; Sept. 30, '38; paints, varnishes, and paint enamels; use since Sept., '36.

411,134. Parker Rust Proof Co., Detroit, Mich.; Sept. 30, '38; chemicals for use in obtaining on metallic surfaces corrosion-resistant paint-holding coatings; use since Sept. 21, '38.

411,138. Harry G. Sargent (Harry G. Sargent Paint Co.), Indianapolis, Ind.; Sept. 30, '38; enamels, stains, paints, varnishes, shellacs, oil colors; use since Jan. 2, '38.

411,139. Skat Co., Hartford, Conn.; Sept. 30, '38; soaps; use since Jan. 1, '38.

411,141. Wagner Electric Corp., St. Louis, Mo.; Sept. 30, '38; fluid composition for use in fluid pressure apparatus and systems, including hydraulic braking apparatus; use since Oct. 1, '34.

411,142. Wagner Electric Corp., St. Louis, Mo.; Sept. 30, '38; composition for use in fluid pressure apparatus and systems; use since Oct. 1, '34.

411,147. Austenal Labs., Inc., New York City; Oct. 1, '38; thermoplastic synthetic resin material; use since Aug. 2, '38.

411,179. Oxford Products Co., Beverly Hills, Calif.; Oct. 1, '38; photographic film developing, fixing, and hardening solutions; use since June 22, '38.

411,205. Beach Soap Co., Lawrence, Mass.; Oct. 3, '38; soap; use since July 11, '38.

411,224. Industrial Soap Co., St. Louis, Mo.; Oct. 3, '38; powdered hand soap; use since Mar. 1, '38.

411,233. Monsanto Chemical Co., St. Louis, Mo.; Oct. 3, '38; phosphate compositions, characterized by their emulsifying, dispersing, deflocculating, water softening, and detergent properties; use since Sept. 7, '38.

411,280. Nuodex Products Co., Elizabeth, N. J.; Oct. 4, '38; drier preservatives for paints, varnishes, and enamels; use since May 9, '38.

411,281. Nuodex Products Co., Elizabeth, N. J.; Oct. 4, '38; ink driers; use since May 9, '35.

411,282. Nuodex Products Co., Elizabeth, N. J.; Oct. 4, '38; driers for paints, etc., and like products for use in paints, etc.; use since June, '37.

411,298. I. G., Frankfort-am-Main, Germany; Oct. 5, '38; hormone preparations for promoting plant growth; use since May 1, '38.

411,337. L. B. Kang, Los Angeles, Calif.; Oct. 6, '38; compound for cleaning painted walls, woodwork, linoleum, etc.; use since July 9, '38.

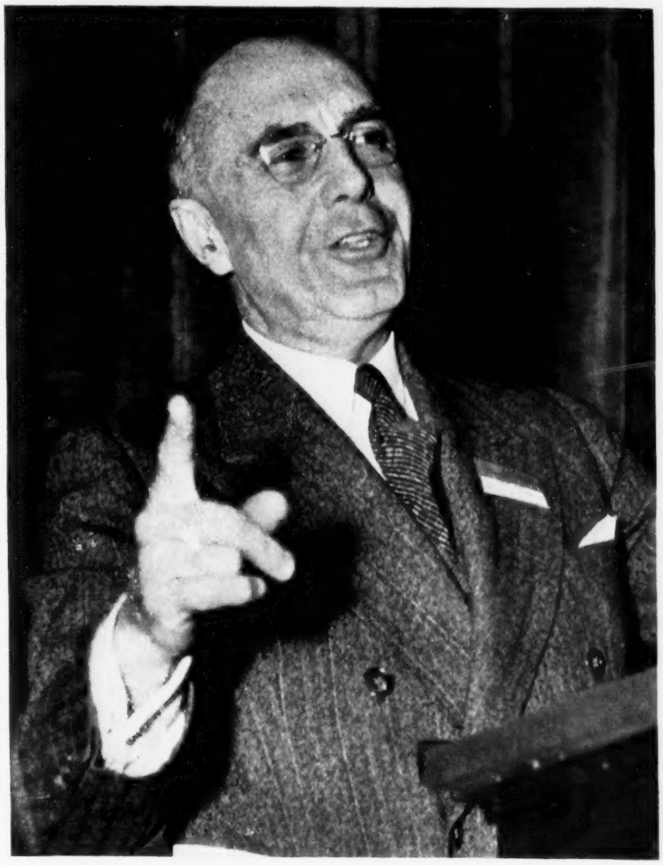
411,357. R. H. Macy & Co., New York City; Oct. 12, '38; lacquers, leads for use as paint pigments, shellacs, primers, etc.; use since Jan., 1933.

Balance of Descriptions will appear in the February issue

Names of the Month

Monsanto Promotions

Left, Victor E. Williams, formerly manager of the New York sales branch, now is assistant general manager of sales. In his new position Mr. Williams will divide his time between New York City and the St. Louis headquarters. Right, A. T. Loeffler, who has been assistant manager of the New York branch, has been promoted to the managership to succeed Mr. Williams.



Europe's armament race has been an important contributing factor in increased American exports to that Continent during the period the U. S. Reciprocal Trade Agreement policy has been in effect, H. L. Derby, President, American Cyanamid and Chemical Corp., told the sessions, in New York, of the Congress of American Industry. Mr. Derby heads the Tariff Committee of the National Association of Manufacturers, which sponsors the Congress.

Frederick Clemens Zeisberg: The industry and particularly the members of the American Institute of Chemical Engineers mourn the loss of Frederick C. Zeisberg, du Pont, who died of a heart attack two days following his re-election as president of the Institute.

George C. Lewis: A former president of the Chemists' Club and president and director of L. Martin Co., New York City, who died suddenly on December 19. Born in Bombay in 1874, he was educated in England, came to the U. S. in 1904, and joined the Martin firm the same year.

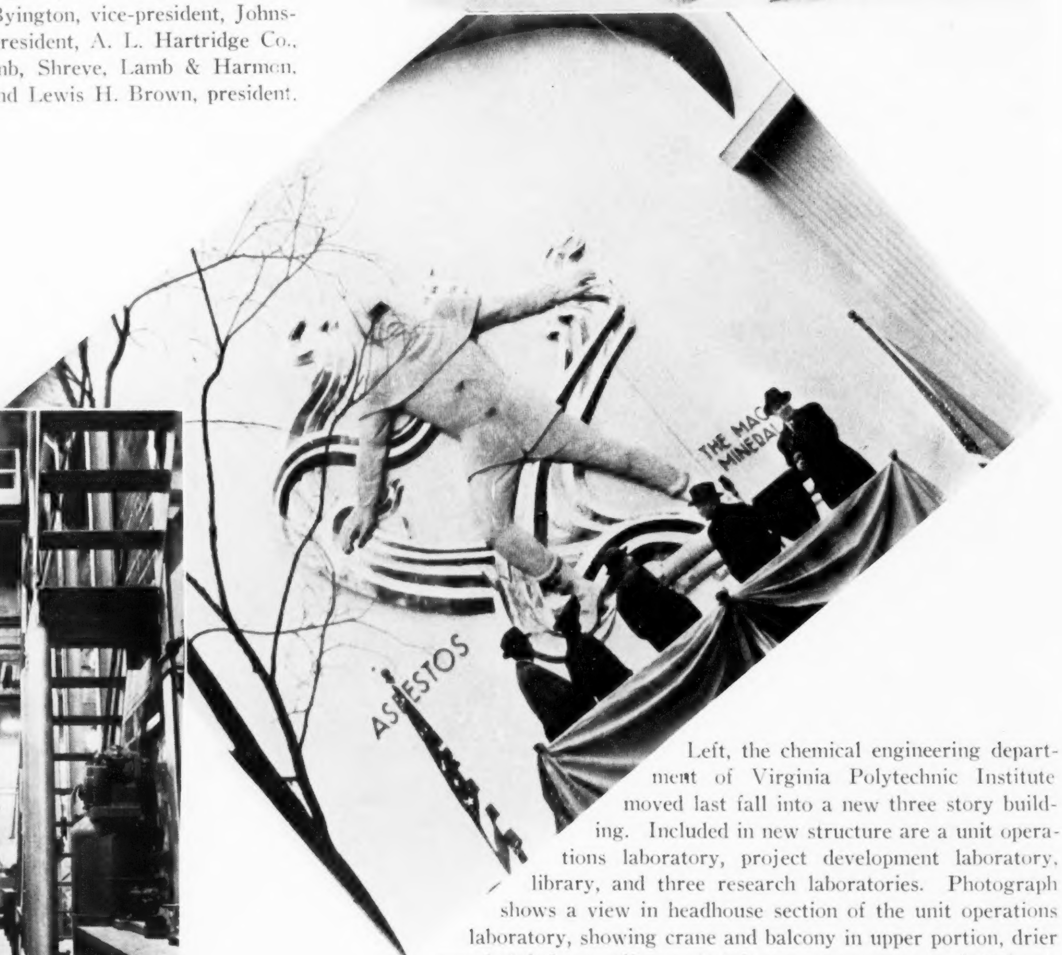
Synthetics Lead Double Life

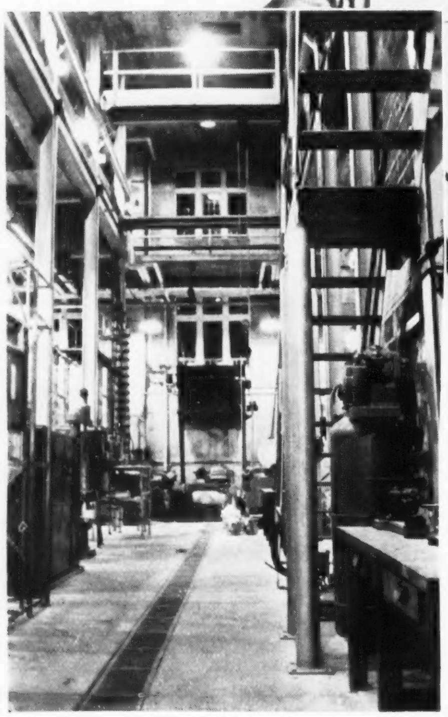
A wet weather investment is forecast in the new white raincoat, pictured in the center, made from the rubber-like material, koroseal, product of The B. F. Goodrich Co. Wide possible uses are indicated for this product.

The photographs on the left and right sides show a two-in-one reversible reefer raincoat, treated on one side with "Zelan," the new du Pont water repellent finish. Without impairing the weave, color or feel of the fabric, "Zelan" renders it resistant to wind and water. Another practical feature is that its effect lasts through repeated cleanings or washings.

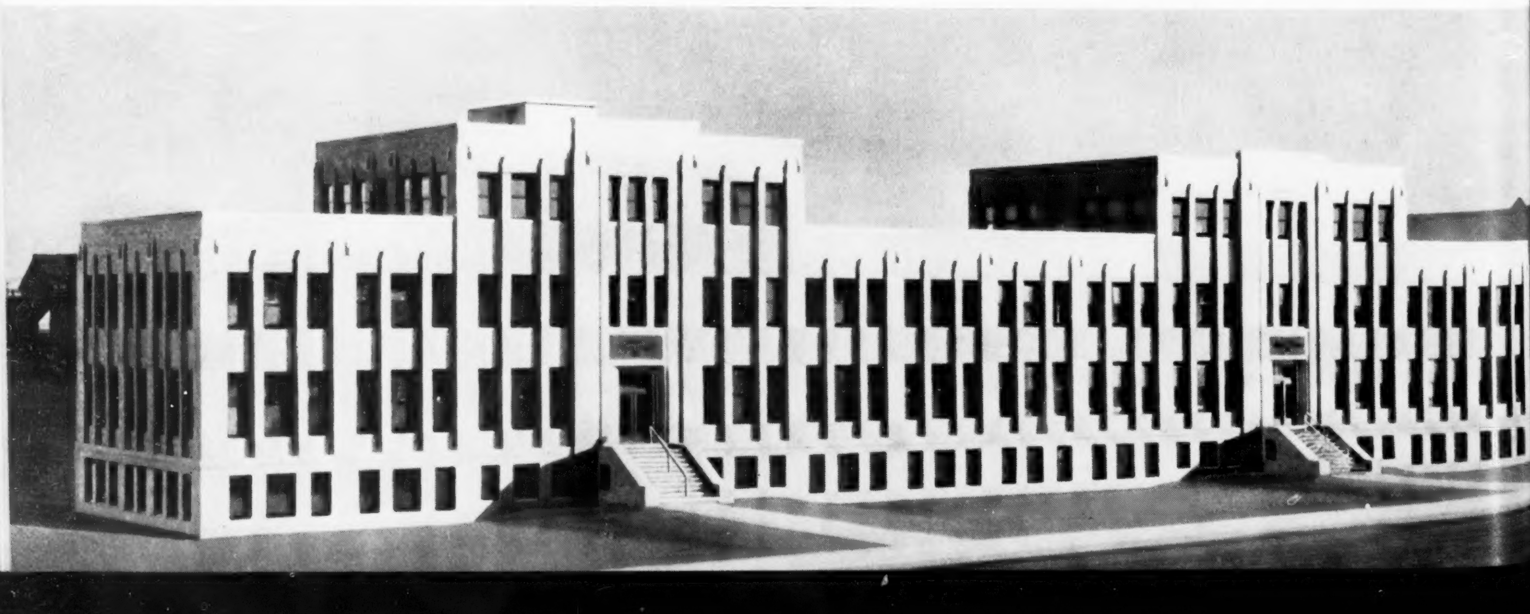
New Buildings

Upper right, proposed new building at Purdue University, now under construction, which will house the reorganized School of Chemical and Metallurgical Engineering. Below, right, Grover Whalen, New York World's Fair president, and other officials inspect the giant figure of an asbestos-clad man, the theme for the Johns-Manville building. Through exhibit company will interpret its services for practically every major industry in America. Left to right are: F. P. Byington, vice-president, Johns-Manville; L. J. Towne, president, A. L. Hartridge Co., contractors; Wm. F. Lamb, Shreve, Lamb & Harmon, architects; Mr. Whalen and Lewis H. Brown, president, Johns-Manville.





Left, the chemical engineering department of Virginia Polytechnic Institute moved last fall into a new three story building. Included in new structure are a unit operations laboratory, project development laboratory, library, and three research laboratories. Photograph shows a view in headhouse section of the unit operations laboratory, showing crane and balcony in upper portion, drier area in left front, still area in left rear, compressor in right front. Evaporator and grinding areas are in the right rear. Below, Barber Asphalt Corp.'s new, additional office building space, with added equipment, which was constructed at cost of a quarter of a million dollars, and provided for removal of the general offices from Philadelphia to the plant at Barber, N. J.



ALKY-GAS REPORT RELEASED

Both Petroleum Industry and Farm Chemurgic Leaders Insist Report Proves the Correctness of Their Respective Positions on This Controversial Subject—

Alcohol as a motor fuel was labeled as currently uneconomic on a national scale in a 125-page book, "Motor Fuels From Farm Products," issued by the Dept. of Agriculture late in December, and written by P. Burke Jacobs and Harry P. Newton, chemists of the industrial farm products research division of the Bureau of Chemistry and Soils.

The conclusion is reached by the two scientists that current economic obstacles to the use of alcohol-gasoline blends as motor fuel are so great as to discourage immediate attempts to promote alky-gas on a national scale as a means of increasing farm income. The issuance of the report follows by only a few days the announcement of the selection of the sites for the new regional laboratories of the federal government charged with the problem of finding new industrial uses for farm products.

Really a Digest or Summary

No new original research work was done by Messrs. Jacobs and Newton. They did, however, exhaustively study all of the available literature on the subject and have digested it so that the book is in reality a handbook on the subject. The economic, agricultural, and technical aspects are dealt with in great detail. The authors have accepted the findings of other chemists that an alcohol-gasoline blend makes a satisfactory motor fuel under certain conditions. They have reviewed briefly the advantages and disadvantages from the purely technical viewpoint.

The publication deals largely with the economic problems of growing crops to produce alcohol, concentrating them at distilleries, construction and operation of alcohol plants, utilization of byproducts, costs of producing alcohol from various crops, and the effect on the petroleum industry of the nation-wide adoption of alcohol-gasoline blends.

The conclusions of the authors are summarized as follows:—

Replacement fuels to supplement future decrease in petroleum production, even if not needed for a decade, should be provided for in advance of any price increase of present fuels.

Future fuels of lowest relative cost will probably be obtained by synthesis from gases and alternatively from agricultural materials.

Blends of ethyl alcohol with gasoline function satisfactorily as fuel for present type internal-combustion engines, especially with increased engine compression ratios and other favorable changes in design.

The most satisfactory blend for present conditions should contain about 10% of alcohol, although other percentages can be used.

Uniformity of concentration and employment of alcohol blends are desirable, and all motor fuels should, therefore, be nationally standardized.

Present crop production is inadequate to permit alcohol production for a national 10% blend without enroachment on normal feed, food, and industrial supplies.

Alcohol production from present crop wastes, culls, and surpluses is unlikely to be continuously adequate for a national 5% blend.

As present costs of producing alcohol do not permit equal competition between blends and straight gasoline, fuels from agricultural products could be used only with some form of supplementary financial support, which might, however, replace present direct or indirect government farm aid. Such use of agricultural products would stimulate industrial activity and employment and perhaps increase farm income, but the higher cost of the fuel would ultimately fall on the taxpayer. Although the sale of crop materials unsalable under present conditions would bring farmers a higher gross income, farmers themselves would carry 20% or more of the higher cost of alcohol fuels.

Production of motor fuels from agricultural materials would entail economic adjustments and present legal and sociological problems. It would also greatly increase costs of government administration and control of alcohol, although regulatory difficulties might perhaps be minimized by using an impure grade of alcohol. A suitable denaturant must be found.

Success in perfecting light Diesel engines of mobile character, or engines employing solid or gaseous fuels, or even improvements in present international-combustion engines not now foreseen would exert a marked influence on future fuel requirements.

Charts Supplied

There are tables showing production and acreage of crops which might be converted into alcohol; their distribution throughout the country; percentages which might be diverted to alcohol; yields per acre, probable yield of alcohol per acre and per bushel or ton; and relative costs of alcohol from various crops.

It is pointed out that an economic alcohol plant should have a capacity of at least 2,000 gals. a day and should be so located as to have available minimum raw materials for 300 days in a year. Tables show the amounts of principal alcohol-producing crops available in chief producing counties throughout the U. S.

Buffum Comments on Report

Asked by CHEMICAL INDUSTRIES to comment on the Jacobs-Newton Report, William W. Buffum, Sr., an outstanding figure in the chemurgic movement for years, long connected with the Chemical Foundation, and now an executive of Acheson Agrol Corp., stated that it was an excellent statement of the true facts about power alcohol; that it substantiated almost completely what the Chemical Foundation has been advocating for years, but that it was absolutely necessary to read the complete report and not just a few pages to get its true significance.

"Unfortunately," stated Mr. Buffum, "most, if not all of the published comments so far on the report have been based on statements contained in a few pages and not on the report as a whole. Any conclusions," continued Mr. Buffum, "drawn from two pages and disregarding the other 123 pages must be erroneous and misleading."

Mr. Buffum pointed out that the significant factor of the plan of the Chemical Foundation and affiliated interests in the chemurgic movement in regard to power alcohol was that the erection of plants was advocated only in such sections as were shown by a comprehensive survey to be economically feasible.

"The Foundation does not advocate power alcohol on a nation-wide scale, at least not for many years until there are sufficient farm crops to make such a move economically feasible," said Mr. Buffum. "But," he continued, "statistics of costs and prices of farm products that are only averages for the whole country have very little significance when reference is being made to one or more particular localities."

Regional Lab. Appointments

Four outstanding scientists of the Dept. of Agriculture have been named as directors of the 4 regional laboratories now being established for the study of industrial uses of surplus farm crops. Assignments are as follows: O. E. May, 37, Northern Laboratory, Peoria; D. F. J. Lynch, 47, Southern Laboratory, New Orleans; P. A. Wells, 32, Eastern Laboratory in Philadelphia area; and T. L. Swenson, 44, Western Laboratory, San Francisco Bay area.

Appointments were announced recently by Dr. Henry G. Knight, chief of the Bureau of Chemistry and Soils. Dr. Knight, assisted by Dr. H. T. Herrick, will direct the entire research program.

Ex-Senator Pope on T. V. A. Board

May Be Appointed Chairman—Monopoly Committee Continues Patent Probe—President Defends Spending in Message—Other Washington Happenings—

In many quarters the opinion is expressed that T.V.A. is likely to give greater emphasis to an expansion of its phosphate program in the next 12 months, despite the keen opposition by the fertilizer industry. It is felt, so it is said, that such a program ties into national defense and conservation plans, can be given a more popular appeal, and certainly is less in the "dog-house" than is the power angle. Power interests would prefer to see current used for chemical production rather than sold to existing customers of theirs, a less direct form of competition.

Pope Gets T.V.A. Post

As has generally been expected in Washington, former Senator James P. Pope of Idaho has been appointed a member of the T.V.A., succeeding the former chairman, Dr. Arthur E. Morgan, who was removed early last year by the President. Readers will recall that Dr. Arthur E. Morgan made serious charges against his two fellow-directors and demanded that a Congressional Investigation of the whole T.V.A. be made. Dr. Morgan was removed when he refused to answer questions put to him by the President when conducting a personal investigation. Senator Pope headed up the Senate committee that has been making a study of the phosphate resources of the country, following the phosphate message of President Roosevelt sent to Congress last year.

Whether ex-Senator Pope will eventually become chairman of T.V.A. is still undetermined. It is significant that two of the 3 members of the committee have very strong interest in the fertilizer side of T.V.A. It is felt in fertilizer circles, however, that the hearings on phosphate have brought to light the fact that phosphate reserves are many times greater than generally supposed by most laymen. Dr. H. A. Morgan, T.V.A. member, has been basing his program ideas on the supposition of relative scarcity.

Patents a Popular Subject

In spite of reports to the contrary, it is expected that the Temporary National Economic Committee (technical name for the Congressional monopoly probe committee) will start first on patents when hearings are resumed on Jan. 16. It proved a popular subject last month. Patent Commissioner Coe and assistants are expected to present case histories of patent experience. Wage and unemployment data from the Labor Dept. is likely to be the next subject to be studied after patents.

Proposed amendments to the Wagner Act generally center around the following 4 points:—1. Permission for employers to ask for elections; 2. assurance of the status of craft unions (similar to the A.F.L. type); 3. the fixing of a definite length of time for the certification of a union to remain effective; 4. permission for the employer to state which union he prefers. The last is bitterly opposed and at the moment seems to have little chance of getting past the opposition. Employers are particularly anxious to have some definite period stated that would stop continual inter-union squabbles over which one has jurisdiction.

There seems to be little doubt but what the country is about to embark on a definite expansion of armaments. The President's message on Jan. 4, militant in tone, asked for a much larger defense program to bar aggression by dictatorships. Such a program must inevitably mean greater consumption of chemicals and allied products.

The President in his address defended his spending policies; declared that an attempt to balance the budget by cutting expenses to income would cause a business reaction. He suggested that a national income of 80 billions (it was 60 billions in '38) would permit balancing of the budget with only very moderate increases in taxes. He intimated that he had no further important social legislation to suggest; admitted that some of the existing laws were roughly hewn and might need smoothing down. He even implied that he might be willing to accept some amendments to the Wagner Act and to the Social Security Act.

F.T.C. Issues Desist Orders

Unlawful price fixing in connection with the sale of calcium chloride in any form is prohibited under an order to cease and desist entered by the Federal Trade Commission against Columbia Alkali, Dow Chemical, Michigan Alkali, and Solvay Sales.

These 4 companies, the Commission found, control the sale and distribution of a substantial majority of the entire output of all forms of calcium chloride in the U. S.

The Commission closed without prejudice its case against Solvay Process, Geddes, N. Y., and Calcium Chloride Association, Detroit, finding that neither had any connection with the unlawful acts and practices alleged in the complaint. Solvay Process owns Solvay Sales Corp., through which it sells its output of calcium chloride. Calcium Chloride Association is a trade association whose membership consists of the 4 companies against which the order to cease and desist is directed.

The order requires the respondent companies to discontinue the following practices when they are engaged in for the purpose of effectuating any agreement or conspiracy to fix or maintain uniform prices:

(1) Maintaining a uniform zoning system for the U. S.; (2) suggesting retail prices to their individual dealers or distributors; (3) exchanging information with reference to the prices each charges; (4) simultaneously changing their sales prices, and (5) offering identical bids for carload or less than carload lots.

Under the order, the respondent companies also are directed to cease eliminating, by agreement, cash discounts for prompt payment by purchasers of calcium chloride. According to findings, the respondent companies, engaged in their price-fixing program from November, 1937, to January, 1938.

Nine companies producing practically all the liquid chlorine manufactured for commercial and industrial purposes in the U. S. have been ordered by the Commission to cease and desist from agreeing and combining to fix and maintain uniform prices for their product. Respondents are:

Mathieson Alkali, Electro Bleaching Gas, Solvay Sales, Hooker Electrochemical, Columbia Alkali, Diamond Alkali, Belle Alkali, Monsanto Chemical, and Pennsylvania Salt Manufacturing.

Order directs that these companies cease and desist from entering into any understanding, agreement, combination and conspiracy between and among any two or more of them, and from continuing any such compacts heretofore entered into among themselves for the purposes of fixing and maintaining uniform prices or enhanced uniform prices.

Order also prohibits respondents from combining and agreeing in the same manner to divide the U. S. into zones for the sale of their product at uniform prices, or at enhanced uniform prices.

Order provides that nothing therein contained shall prohibit the exercise by the respondents of their lawful rights under the patent laws of the U. S.

Diamond Moves Headquarters

Diamond Alkali's main offices have been moved from the Koppers Bldg., on 7th ave., Pittsburgh, to the Oliver Bldg., on Smithfield st. Preparations for the move were made some time ago so that the change could be made between Christmas and New Year. At the Koppers address the headquarters of the company was on two and one-half floors. At their new location they will occupy one entire floor, the 24th.

Landis Gets Perkin Medal

Perkin Medal for '39 was presented Jan. 6 to Dr. Walter S. Landis, vice-president, American Cyanamid, at a joint meeting of the American Section of the Society of Chemical Industry and the A. C. S., held at The Chemists' Club, N. Y. City. Victor G. Bartram, president of the Society, presided. Dr. Wallace P. Cohoe, chairman of the American Section, opened the program with a commemoration of former medalists. After a talk on Dr. Landis, the man, by Floyd Parsons, and a talk on the scientific accomplishments of the medalist, by Dr. C. M. A. Stine, the medal was presented to Dr. Landis by Prof. Marston T. Bogert. After the presentation Dr. Landis gave his medal address entitled "Argon."

Monsanto Promotions

Promotion of Victor E. Williams, manager of the N. Y. sales branch of Monsanto Chemical, to assistant general manager of sales was announced Dec. 26 by G. Lee Camp, vice president. In his new position, Mr. Williams will divide his time between N. Y. City and the St. Louis headquarters of Monsanto.

A. T. Loeffler, who has been assistant manager of the N. Y. branch, has been promoted to the managership to succeed Mr. Williams.

F. C. Renner, assistant general manager of sales, Merrimac Division of Monsanto, Boston, has been promoted to succeed Mr. Loeffler at N. Y. City.

McBride Now a Consultant

Gordon W. McBride who resigned as of Jan. 1 from the chemical department of Procter & Gamble Co., Cincinnati, has become associated with his father, Russell S. McBride, in consulting chemical engineering practice, with offices at 712 Jackson pl., Washington, D. C.

Williams With Huber

Ira Williams, associated with the Jackson Laboratory of du Pont since '29, and for many years head of the rubber division of that laboratory, resigned Dec. 1 to join J. M. Huber, Inc., as director of research. He will maintain headquarters at the company's laboratories in Borger.

Marshall Heads Rumford

Albert E. Marshall is the newly elected president of Rumford Chemical Works. Rumford, R. I. Mr. Marshall has been on the directorate of the company since '36, and a member of the executive committee since early '38. He is an authority on the manufacture of phosphates, sulfuric acid, alkalies, having designed and operated many such plants and having contributed to the art in various patents.

Born in Liverpool, England, Mr. Marshall has spent his working life in the U. S., and has served as consultant for many corporations. He served two terms as president of the A. I. Ch. E. and was chairman of the Society of Chemical Industry. He is now vice president of the Chemists' Club, N. Y. City, and is also a fellow of the Royal Society of Arts, and a member of the A. C. S., and the American Institute of Mining and Metallurgical Engineers.

His work has been principally concerned with plant design, studies of product manufacture, and product handling in the market. Rumford Chemical Works, which produces various chemical products, is a dominant figure in the baking powder business, producing a phosphate baking powder widely known in the U. S. and many foreign countries since Prof. Eben Horsford founded the company in 1859.

New Prior Representatives

Announcement has been made by Prior Chemical Corp., N. Y. City, that its sales force has been increased by two additional representatives, F. Dean Hildebrandt and Harold B. Chase. Mr. Chase will have his headquarters in Portland, Me., and Mr. Hildebrandt's headquarters will be Chicago. For the past 3 years Mr. Hildebrandt has been manager of the Chicago office of J. T. Baker Chemical. Previously, he was southern representative for that concern and prior thereto he served several years as advertising manager of Chase National Bank in N. Y.

F. Dean Hildebrandt

Harold B. Chase

Mr. Chase comes to the Prior organization from a long connection with the Brown Co. of Portland, Me., with which concern he served as purchasing agent. For the Prior company Mr. Chase will cover the New England territory where he is well and favorably known in the paper trade.

Others in New Positions

W. A. LaLande, Jr., is now research director of the Attapulgus Clay Co., Philadelphia . . . William F. Tuley, formerly in charge of research and sales service work on rubber chemicals for Naugatuck Chemical Division of U. S. Rubber, is now at the N. Y. City office of the company as assistant to Elmer Roberts, vice-president and general manager of the Naugatuck division . . . Sidney D. Wells, widely known in paper, is now on the research staff of the Institute of Paper Chemistry, Appleton, Wisc. . . . William E. Yelland, who has been researching for the U. S. Institute of Textile Research, is now with the research division of Corn Products at Edgewater, N. J. . . . Dr. George Sachs, formerly with J. T. Baker Chemical, is now on the faculty of Case. He is widely known as an authority on physical metallurgy.

U. S. Industrial Chemicals, Inc.

President C. S. Munson of U. S. Industrial Alcohol Co. announces that on Jan. 1, 1939, all manufacturing and selling activities of the U. S. Industrial Alcohol organization, with the exception of resins, are being conducted by U. S. Industrial Chemicals, Inc., a wholly owned subsidiary, formerly known as U. S. Industrial Alcohol Sales Co., Inc. This change of name designates more accurately the present nature of the U. S. I. organization's business and reflects also its greatly widened scope in the chemical field. The same organization and plant facilities will continue to serve U. S. I.'s customers as before.

U. S. Industrial Chemicals, Inc., today manufactures widely diversified chemical products and supplies them to virtually every important industry using such chemicals in its processes. The contrast with 1906, when U. S. Industrial Alcohol Co. was organized, is sharp. Its sole product then was industrial alcohol. Today the U. S. I. organization manufactures and sells solvents, chemicals, resins, intermediates, anti-freeze, industrial alcohols (pure and denatured), and a vitamin concentrate for stock and poultry feedstuffs.

Upon its incorporation in 1906, U. S. Industrial Alcohol Co. was the pioneer manufacturer of industrial alcohol in this country.

The most recent major step in widening the chemical activities of U. S. I. was its entry into the resin business.

U. S. Industrial Chemicals, Inc., is beginning the manufacture of cellulose acetate at a new plant constructed for this purpose at Baltimore, Md.

News of the Specialties

N. A. I. D. M. & M. C. A. Draft Model Law

Combine Efforts to Formulate a Model for State Insecticide and Fungicide Laws—New N. Y. City Ruling on Water Treatment—News of the Specialty Companies—

Purdue Conference Jan. 20

Third annual pest control operators conference will be held at Purdue University, Lafayette, Ind., Jan. 16-20. Conference is sponsored by the National Pest Control Association and the department of entomology of the university. Registration will begin at noon, Jan. 16, in the agricultural building of the university. Acting Dean V. C. Freeman will deliver the address of welcome, and J. J. Davis, of Purdue, will give an address entitled "Our Problems." State and Federal officials and representatives of manufacturers and operators will be the speakers at the conference.

The Southern pest control operators conference will be held at the University of Louisiana, Jan. 30, through Feb. 1. The Pacific coast pest control operators conference will be held at the University of California, Berkeley, Feb. 20-22.

Scher Widens Line

Scher Bros. of 222 Railroad ave., Paterson, N. J., is now local representative for the entire line of textile soaps and specialties produced by Colgate-Palmolive-Peet Co. Robert Scher has been identified with the textile industry for over 20 years. Company distributes a complete line of alkalies, acids, other chemicals and specialties in Paterson and the Metropolitan area. Recently the company has formed the Chemical Corp. of America which acts as the dyestuff distributing branch of the company.

Sells Soap Division

The Hecker Products Co. has sold its soap business to Lever Brothers Company of Cambridge, Mass., for about $2,500,000 in cash. According to George K. Morrow, chairman of the Hecker Products Co., the soap division of the company has not been a consistent money maker.

Textile Printing Process

Maas & Waldstein Co., of Newark, N. J., manufacturers of textile lacquers, are about ready to announce the development of a new basic improvement in textile printing compounds. It is stated that present indications are that it will eliminate the faults of the present quick drying materials of nitrocellulose and synthetic compositions. They will show considerable advancement in this type of printing. A more definite announcement and full information regarding this product will be available shortly.

Manufacturing Chemists' Association and the National Association of Insecticide & Disinfectant Manufacturers have combined their efforts in the formulation of a draft of a model for state insecticide and fungicide laws.

The draft, which has been approved by the M. C. A. insecticide and fungicide committee, is intended to furnish a means of promoting the enactment of uniform legislation in the several States early in 1939.

Proposed law would have to do with standardization, adulteration, and misbranding of insecticides, fungicides, disinfectants, herbicides, and rodent-killers, and it would require annual registration of such products. Proposed penalties are relatively light—a fine of not more than $25 for a first offense, and one of not more than $100 for any subsequent offense.

The definitive provisions of the model bill are as follows:

Section 1. Definitions

Certain terms appearing in this act shall be defined as follows:

(a) The term "person," shall include any firm, corporation, partnership, association, trust, joint stock company, or unincorporated organization.

(b) The term, "insecticide or fungicide" shall be construed to mean and include any and all substances, including disinfectants, intended for use in preventing, destroying, repelling or mitigating insects, rodents, fungi (and bacteria) or weeds or other pests, but to exclude drugs, poisons, chemicals, or other preparations sold or intended for medicinal or toilet purposes or for use in the arts or sciences.

(c) The term "professed standard of quality" shall be construed to mean either a statement of the name and percentage of each active ingredient together with the total percentage of all inert ingredients contained in an insecticide or fungicide, or, in lieu thereof, a statement of the name and percentage of each inert ingredient together with the total percentage of all active ingredients contained in an insecticide or fungicide.

(d) The term "adulterated" shall apply to any insecticide or fungicide, the strength or purity of which falls below its professed standard of quality.

(e) The term "misbranded" shall apply to any insecticide or fungicide, the package or label of which shall bear any statement regarding such article or its ingredients which does not conform to the requirements of this act.

(f) The term "registrant" shall apply to the person registering any insecticide or fungicide pursuant to the provisions of section 3 of this act.

Section 2. Sale

It shall be unlawful for any person to deliver, distribute, sell, expose or offer for sale, either at wholesale or retail within this State:

(a) Any insecticide or fungicide unless the same shall be enclosed in the registrant's original unbroken container or package to which is affixed a label bearing:—(1) the name and address of the manufacturer, registrant, or person for whom manufactured; (2) the name, brand, or trademark under which said article is sold; (3) its professed standard of quality, and (4) the net weight or measure of the contents.

(b) Any insecticide or fungicide which contains arsenic, any of its combinations, or any other substance or substances highly toxic to man, unless the same shall be enclosed in the original unbroken container of the manufacturer, registrant, or person for whom manufactured, to which is affixed a label bearing in addition to the foregoing:—(5) the skull and crossbones; (6) the word "poison" in red on a background of distinctly contrasting color, and, (7) an antidote therefor.

(c) Any insecticide or fungicide, the contents of which do not conform to its professed standard of quality.

(d) Any insecticide or fungicide or any material represented to be an insecticide or fungicide which has not been registered pursuant to the provisions of section 3 of this act.

Section 3. Registration

Every insecticide or fungicide manufactured, compounded, distributed, sold, offered or exposed for sale, either at wholesale or retail within this state shall be registered each year by its manufacturer, or some distributor thereof, with the ———— of Agriculture of this State by filing with said ———— a statement of (1) the name and address of the registrant; (2) the name, brand or trademark of the insecticide or fungicide registered, and, (3) the matter to appear upon its labels. Every registrant shall pay a fee of $2.00 accompanying the first registration statement in each fiscal year, provided, however, that the registration of any number of insecticides or fungicides by one registrant during each fiscal year shall not exceed a total fee of $25.00.

Must Obtain Permits

The Health Dept. of the City of N. Y. announces that the Board of Health has adopted a regulation requiring concerns engaged in chemically treating water supply systems in buildings to obtain permits from the department. The ruling also stipulates that permits will be issued only where "fully qualified chemical engineers are in responsible charge of all operations in connection with water treatments in buildings," the announcement adds.

"A report is to be submitted to the Dept. of Health within 24 hours after installation or servicing of any new locations," the announcement said. "Eight chemical compounds have been specified which alone can be added to the water supply, and with maximum limits that are given."

The department explained the ruling was the result of fear expressed by some city departments that the quality of water might be affected if mistakes or accidents occurred during the chemical treatment. Such treatment usually is intended to reduce corrosion in piping systems.

"So-White" Registered

The Patent Office has held that H. Kirk White & Co., Oconomowoc, Wis., is entitled to register "So-White Hand Cleaner," the last two words being disclaimed, as a trademark for powdered hand cleaner, notwithstanding use by Oakite Products, Inc., N. Y. City, of the term, "Oakite," as a trademark for a cleaning powder.

Firm Name Changed

Leather Finish, Inc., Malden, Mass., changes its name to the Malrex Chemical Co. Reason given for the change is that

the former name did not truly designate the nature of the business. Company manufactures "Rex" line of compounds, recommended for use in the stabilizing and thickening of latex among other applications.

Gets New Account

Atlantic Blacking & Chemical Co., Brooklyn, N. Y., has been appointed selling agent for Lester F. Kittle, Inc., N. Y. The Atlantic company will handle sales of crepe rubber and liquid latex to the shoe and slipper manufacturers in the entire Metropolitan area.

Glickman With WaxPol

WaxPol Laboratories, 247 Lorraine st., Brooklyn, is a new manufacturer in the synthetic chemical and wax specialties field. C. S. Glickman, well-known consultant on industrial and household specialties, is in charge of research and development and in the erection and design of the plant.

Swope in New Connection

Morris C. Swope has resigned from the Alex C. Fergusson Co., Drexel Bldg., Philadelphia, to accept the position as sales manager for Montgomery Bros., Inc., office and plant located at Penrose ave. and Packer st., Philadelphia.

Montgomery Bros. were established in 1887 and are engaged in the manufacture of rubber cements, latex and synthetic rubber compounds and coatings. Mr. Swope will merchandise their already established line together with various other chemical specialties and will continue the distribution of Union Oil of California aromatic solvents.

Midway Signs Stipulation

Midway Chemical Co., 257 Cornelison ave., Jersey City, N. J., a dealer in insecticides stipulates that it will desist from advertising that the use of Fly-Ded will exterminate flies, mosquitoes and moths and generally that this preparation is harmless; that the use of De Luxe Cleaning Fluid leaves no rings, wave marks or spots and that the fluid cannot explode; that Ant Flowers kills any but sweet eating ants; that Garden Spray is effective against cut worms and that Swish Stock Spray is effective against all types of flies and insects, is harmless and will not taint milk.

Tubbs in New Field

Leonard G. Tubbs is now representing Arnold, Hoffman & Co., chemical manufacturers, in N. Y. City, with headquarters at 350 Madison ave. He is well known and highly regarded in the textile industry. For 11 years he was associated with the U. S. Finishing Co., at that time the largest dyeing, printing and finishing concern in the country, having complete charge of all purchases from 1927 to 1930.

From '30 to '37 he acted in a similar capacity for National Dyeing & Printing with plants in the U. S. and Canada; and from January to August, 1938, he served as assistant to the president of John Campbell & Co.

Throws Christmas Party

The Baltimore Paint & Color Works, Inc., held its annual Christmas party for employees and friends at Nolan's Night Club on Dec. 24. There was a large orchestra for dancing and a fine floor show was in progress throughout the afternoon.

Morres Shuger, president, announced that ground will soon be broken for another building that will house additional machinery and give employment to more persons. This is the 10th addition to the plant since 1926. Mr. Shuger also stated that the year of 1938 produced the largest volume of business in the company's history.

Main plant and general offices are still located at 148-156 and 143-155 McPhail st., Baltimore, Md.

Phoenix Appoints Holterhoff

Hans A. Holterhoff is now sales manager and head of the technical service department of Phoenix Color & Chemical Co., Inc., dyestuff manufacturers of Paterson, N. J., it was recently announced by Lincoln M. Shafer, president of the company.

N.A.I.D.M. Retains Fuller

National Association of Insecticide and Disinfectant Manufacturers has retained Henry C. Fuller, Washington, to act as special adviser in 1939 to the Association on technical and legislative matters. Robert Wilson, N. Y. City, is being retained as special counsel.

Offers New Free Service

For scientific service to hosiery manufacturers, Alco Oil & Chemical has added to its technical department a Frazier Testing Machine and complete apparatus for microphotography.

Case in Special Sales Work

Bernard C. Case joins the staff of the Hanson-Van Winkle-Munning Co., manufacturers of electroplating equipment and supplies, Matawan, N. J. Mr. Case, who will devote himself to special sales work for the company, graduated from the University of Michigan in 1928. He has been engaged in chemical work, first for Eaton Manufacturing, Cleveland, and later for Bridgeport Brass, Bridgeport, Conn., where he was in charge of plating. Mr. Case has done original research in electroplating and has taken out a patent (assigned to Eaton Manufacturing) on an anode for the control of pitting in nickel solutions.

F. T. C. Charges Violation

R. M. Hollingshead Corp., 840 Cooper st., Camden, N. J., manufacturer of "automobile chemicals," is charged with violation of the Federal Trade Commission Act in a complaint issued by the Commission. The respondent company has distributing and sales offices in St. Paul, San Francisco, and N. Y.

It is alleged that the respondent company, in order to promote the sale of its "Whiz Line" to dealers, has undertaken to create and maintain a monopoly in the automobile chemical business and hinder its competitors in disposing of their wares.

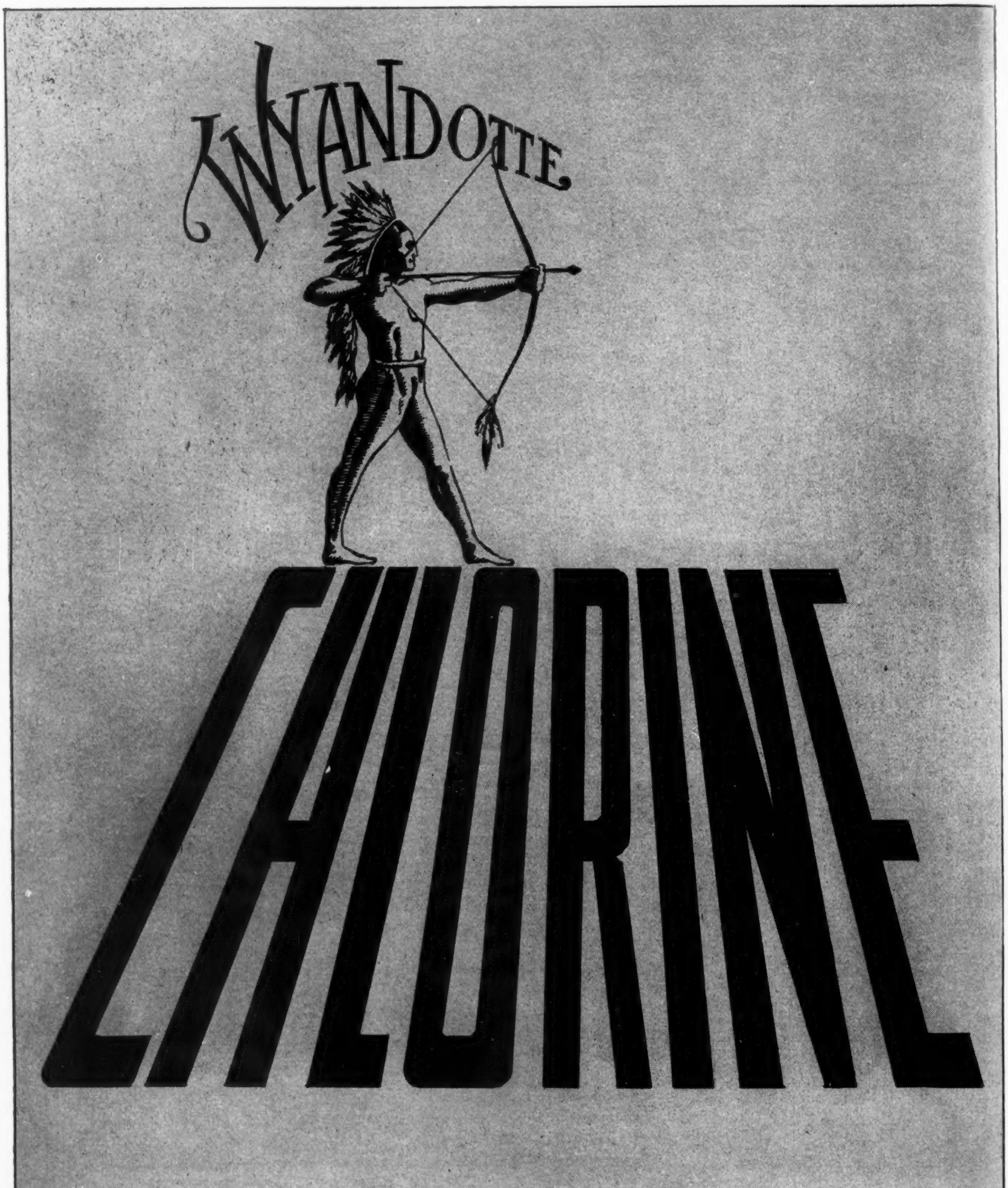
Respondent company, it is alleged, has unfairly disparaged competitors and their goods and has endeavored to effectuate its monopolistic purposes by use of the following practices:

(1) Making agreements under which it will accept from jobbers and wholesalers, purchasing the "Whiz Line" for the first time, any products, from their own stock of a similar character manufactured by others, which the jobber or wholesaler selects and delivers in a single shipment, transportation paid, to the respondent company at Camden, N. J.

(2) Upon receipt of such products, crediting the jobber or wholesaler to the extent of the cost to such dealer of the goods received, provided such credit will be applicable only within one year, only against purchases of Whiz Line items and only for 25% of the amount of such purchases.

(3) Storing merchandise so received by the respondent company until a substantial amount has accumulated, when it is sold to "distress merchandise" dealers at a figure far below the amount of the credit which the respondent has given, and far below the cost of the same merchandise to those from whom the respondent acquired it.

It is alleged that the respondent's practices have the tendency and effect of placing such distress merchandise dealers in a position to reintroduce many of these wares into the channels of trade at prices below those ordinarily current; of unreasonably restraining the manufacturers of such products in disposing of their new merchandise at current prices because of the availability of such wares to wholesalers and retailers at cut prices; of restraining dealers who have obtained or might acquire such products from the manufacturers thereof from selling them at current prices; and of demoralizing such manufacturers' market for their products and injuring their reputations and those of their goods.


WYANDOTTE
CHLORINE

Chlorine Prices Slashed $3.00 a Ton

Manganese Dioxide Quoted Lower—Chrome Cake Reduced —Sodium Silicofluoride Competitive—Seasonal Influences Affect December Volume—Contract Season About Over—

As was naturally to be expected industrial chemical tonnages declined in December quite sharply from the October-November level. The approach of the holiday period and the desire on the part of most purchasing agents to keep inventories low at the year-end were the two principal factors for the seasonal let-up. Compared with the December '37 volume, last month showed a very definite gain in volume—an encouraging factor for the first part of '39.

Much of the time and energy of the various chemical sales forces last month were devoted to rounding up the last of the contracts for the new year. The most important news, of course, was the break along about the middle of the month of 15c per 100 lbs., or $3 a ton in the tankcar and multiple cylinder car price for chlorine. On the new basis tanks, single unit, are priced at $2 per 100 lbs., works, freight equalized. Multiple unit, 3 or over, is priced at $2.15; two units at $2.40; and one unit at $2.85.

A sharp decline was announced in Caucasian manganese dioxide. This with the two previous reductions brings quotations for '39 down to the following extremely low levels:—Barrels, carlots, works, $51.50 per ton; less carlots, 5 tons, works, $54.50 per ton; smaller lots, works, $59.50 per ton; burlap bags, carlots, works, $49.25 per ton; less carlots, 5 tons, $52.25 per ton; smaller lots, works, $57.25 per ton; paper bags, carlots, works, $47.50 per ton, and less carlots, 5 tons, works, $50.50 per ton.

Some of the other more important price changes of the month were:—a $1 reduction in the bulk price of chrome cake, a ¼c decline in domestic sodium silicofluoride to a basis of 4½c, a 70c drop in tungsten metal, powdered, to a basis of $2.10, and a loss of ¼c in soaplye glycerine very early in December. The change in sodium silicofluoride was made to meet severe import competition. On the up-side of the market the principal changes were caused by a stiffening in tin quotations, necessitating higher prices for sodium stannate, tin crystals, anhydrous tin chloride, and tin tetrachloride.

A large number of industrial chemicals were quoted for '39 at prices unchanged from '38 quotations including:—ammonia aldehyde; barium salts; cobalt salts; magnesium chloride; manganese salts (except the dioxide); nickel salts; gallic, pyrogallic and tannic acids; ammonium, potassium and sodium oxalates; ammonium and magnesium fluorides; potassium metabisulfite; potassium permanganate; titanium oxalate; sodium sesquisilicate; and thorium nitrate.

Also zinc carbonate; sodium bifluoride; saltpeter; potassium chlorate; methyl chloride; calcium phosphate; ammonium bifluoride, fluoride, nitrate, perchlorate, persulfate, and phosphate; and sodium and potassium prussiates.

Antimony metal developed considerable weakness early in December and then staged a bit of price recovery, but not sufficient to make up for the early loss. Competition is increasing in sodium tetrapryophosphate. One large producer of carbon tetrachloride has placed its price schedule on a gallon basis rather than a pound basis. A more detailed report of this will be found in the Solvents Section.

A simpler schedule on calcium sulfide has been released. The price of 70%, CaS, 50 mesh in carlots is $46 per ton, f.o.b. works in burlap bags. For 80% material the price is $51 per ton.

A survey of both manufacturers and jobbers at the end of the first week of January indicated that the contract season was practically at an end. Aside from a very few exceptions, prices have remained quite stable. From many angles the renewal period has been one of the most satisfactory in years from both the buyers' and the sellers' viewpoints. The first week of the new year showed very little signs of sudden improvement over the dull holiday period, but all indications point to improvement by the middle of January. Stocks in the hands of consumers are generally very low.

Conditions in Process Fields

Conditions in the major chemical consuming industries continue to be satisfactory, although preliminary reports for December do show a natural seasonal letup in most groups. With a small gain over October, plate glass in November (12,883,448 sq. ft.) reached the highest total for any month in '38. November was the first month thus far in '38 to show a gain over the corresponding month of '37. For the first 11 months of '38, production aggregated 73,034,657 sq. ft., as compared with 192,592,600 in the whole of '37. Production of window glass during November was at the best rate in some months and totaled 882,595 boxes. This was at the rate of 54.4% of capacity. October output was 641,394 boxes, while in November of '37 the total was 1,095,267 boxes.

Textiles showed improvement in November. Silk deliveries in that month totaled 41,599 bales, an increase of 17% from the October level. November 1937 deliveries amounted to only 31,749 bales. November's cotton consumption of 596,289 bales was 113,313 bales higher than in the corresponding month of last year. Cotton spindles active in November totaled 22,449,280, compared with 22,113,952 in October and 22,777,818 for November of '37. Cotton spindles were operated during November at 83.6% capacity, comparing with 81.9 for October, and 69.8 for November of '37. There is, of course, usually a seasonal rise in cotton goods production at this period.

November rayon filament yarn deliveries were reported by the *Rayon Organon* at 21,000,000 lbs., as compared with 24,500,000 lbs. in October and 9,400,000 lbs. in November of '37. Rayon yarn shipments for 11 months of '38 at 250,000,000 lbs. are essentially equal to the 257,000,000 lbs. shipped during the same period of '37. But the outlook for December shipments this year is substantially brighter than in December of '37.

Rubber tire inventories during November dropped to the lowest level of the year as shipments showed an increase over the month's production. Shipments during November were the greatest since August, '37, and represented an increase of 7.2% over shipments made in October and 17.6% more than for November of '37. Production during November, however, showed a slight decline from October, a decrease of less than 1%. Our consumption of crude rubber in November totaled 46,048 tons, as compared with but 40,333 tons in October and with 34,025 tons in November of '37.

Nineteen producers of hardwood charcoal are charged in a complaint issued by the Federal Trade Commission with participating in price-fixing conspiracies for the purpose of eliminating and suppressing price competition in the sale of their product to the wholesale and retail trade.

Important Price Changes

ADVANCED	Dec. 31	Nov. 30
Sodium stannate	$0.31½	$0.31
Tin straits	.46¾	.46⅛
crystals	.36½	.36
chloride	.44½	.44
tetrachloride	.23¾	.23¼
DECLINED		
Antimony, metal	$0.11¾	$0.12¼
Chlorine, tanks	2.00	2.15
multiple units	2.15	2.30
Chrome cake, bulk	14.00	15.00
Glycerine, soaplye	.07½	.07¾
Manganese Dioxide		
Caucasian bbls.	51.50	59.00
burlap bags	49.25	56.75
paper bags	47.50	55.00
Sodium silicofluoride, dom.	.04½	.04¾
Tungsten, powder, 99%	2.10	2.80

Fine Chemicals

Mercurials Advanced Sharply

A 10c Rise Halts Long Decline in Vanillin—Agar Quoted Higher—Saccharin Weak—Fair Demand for Salicylates—Citric, Tartaric Seasonally Quiet—

A steady but quiet tone prevailed throughout the past 30 days in the markets for fine chemicals, pharmaceuticals, aromatics, and essential oils. Sales were considerably ahead of the same period 12 months earlier. Some seasonal slackening off in the last half of the month was reported, but in most well-informed quarters it was said that the decline was only seasonal and simply reflected what usually takes place in the holiday and inventory-taking period. Much of the interest and talk centered around the sensational disclosures concerning McKesson & Robbins and its president Coster-Musica.*

Price stability continued in most items. The recent sharp advances in quicksilver finally were reflected in higher prices for calomel, corrosive sublimate, the mercury oxides and white precipitate.

Of much more than passing interest was the reversal in the downward trend of vanillin prices. Competition in this item has been particularly severe in the past several months and the 10c advance made in the third week of December came somewhat as a surprise to the market.

Saccharin was lowered 25c last month and is now quoted at $1.45 per lb. in 100-lb. drums and at $1.48 in 25-lb. cans. Agar prices were bullish, mainly on the report of the possible formation of a cartel among Japanese shippers. No. 1 was quoted at 90-94c; No. 2 at 85-89c. A lower quotation for sulfanilamide was among the other price changes of the month, the decline being 25c per lb., and the new level $1.25 per lb.

A ¼c reduction in soaplye grade of glycerine was introduced early in December. Some feeling existed in the trade that this might be the forerunner of a general price reduction in other grades. However, at the year-end, quotations on c.p. glycerine were holding fairly steady.

A steady market in alcohol prevailed after the announcement of the first quarter prices. Consumption for industrial purposes was seasonally good, while a cold snap early in December aided materially in getting anti-freeze alcohol into consumers' hands.

A fairly good demand was reported for seasonal items, such as the salicylates, menthol, etc. On the other hand citric and the tartars were seasonally dull. A better than normal seasonal demand for camphor was noted.

A steady improvement in sales is anticipated in the first few weeks of the new year. Inventories in the hands of consumers are not large and for this reason, plus the fact that basic raw materials are holding firm, fine chemical and pharmaceutical manufacturers expect a better volume of business.

Hand-to-mouth buying appeared to be the rule in trading in aromatics and essential oils. Demand was fair, but sales were generally for small quantities. Price tones were generally firm.

Important Price Changes

	Dec. 31	Nov. 30
ADVANCED		
Agar No. 1	$0.90	$0.85
Calomel	1.36	1.28
Corrosive sublimate, powd.	1.05	.99
Mercury oxide, yellow U. S. P.	1.83	1.73
N. F. Red	1.56	1.46
Vanillin, ex-eugenol	2.20	2.10
ex-guaiacol	2.10	2.00
ex-lignin	2.10	2.00
White precipitate	1.69	1.59
DECLINED		
Saccharin, drs.	$1.45	$1.70
Sulfanilamide	1.25	1.50

Ellis With Firmenich

Firmenich & Co., American distributor of Chuit-Naef aromatic materials, N. Y. City, has engaged Edgar R. Ellis as salesman in the Metropolitan district. Mr. Ellis, recently a member of the editorial staff of the *Oil, Paint & Drug Reporter*, has been connected with the chemical trades for a number of years.

D.C.A.T.'s Forum

Plans for "The Industry Forum—1939" were revealed recently by the Drug, Chemical and Allied Trades Section of the N. Y. Board of Trades, under whose sponsorship it will be conducted.

The forum, first of its kind for the industry, will take place Jan. 17 at the Astor. Its purpose is to present a comprehensive view of problems facing the trade.

The industry's various divisions will be represented by important leaders who, in 5-minute talks, will express their views on the outlook for 1939.

Included in the trends to be discussed are legislation, regulations, the employment situation, trade volume and public relations.

H. L. Derby, president, American Cyanamid & Chemical, will discuss the '39 outlook for the chemical industry before the forum. R. D. Keim, Squibb vice-president, will review the outlook in the pharmaceutical field.

A luncheon will precede the forum at 12:30 P. M.

Candee Honored

A banquet was held last month by the Drug, Cosmetic & Chemical Men's Association in honor of L. Candee of L. Sonneborn Sons, Inc., former chairman of the organization. Edwin P. Agnew of Heyden Chemical, present chairman, presided. About 90 attended including members and guests.

To Honor Magnus

Percy C. Magnus, president, Magnus, Mabee & Reynard, N. Y. City essential oil house, and retiring president of the N. Y. Board of Trade, will be honored at a dinner at the Waldorf on Jan. 26. Mr. Magnus has completed 6 years as president of the Board of Trade in which time the membership has been increased 60%.

Kroneman with D. & O.

William F. Kroneman, formerly in charge of the insecticide dept. of Sherwood Petroleum, and more recently associated with R. J. Prentiss & Co., in a similar capacity, joins Dodge & Olcott. He has been appointed a special representative for the sale of the company's branded product known as "Essenol," an insecticide activator based on the penetrating properties of specially processed essential oils.

Fritzsche's St. Louis Office

Fritzsche Brothers, N. Y. City essential oil and aromatic house, has announced that all sales of its products in the St. Louis territory will now be made at the company's own branch office, 308 S. 4th st. For 25 years Barada & Page, Inc., has served as distributor of Fritzsche products in that territory. The branch will be in charge of Franc A. Barada, son of A. S. Barada, one of the founders of Barada & Page.

Celebrates 20th Anniversary

Congratulations poured in on H. H. Rosenthal, president of the H. H. Rosenthal Co., 25 E. 26th st., N. Y. City, on Dec. 28—the 20th anniversary of the establishment of the business. In that period he has built up an organization that not only is widely known in drug and chemical circles in this country, but has become universally recognized in export and import circles throughout the world. Under the direction of Mr. Rosenthal and Herman Bercow, who joined their forces several years ago, the firm has greatly expanded the number of products it imports and exports and distributes in the U. S.

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* On December 15, Irving and Donald McKesson issued a statement that they have had no connection with M. & R. for years. As everyone knows, they are with N. Y. Q.

Coal-tar Chemicals

Cresylic Acid, Cresol Reduced For 1939

Higher Prices Quoted for Pyridine—Domestic Crude Naphthalene Lowered—Seasonal Decline in Shipments of Benzol, Toluol and Xylol—November Coking Operations at Higher Levels—

Coal-tar chemicals were seasonally dull during the holiday and inventory period, but the month of December as a whole compared very favorably on a tonnage basis with the same month a year previous. Much of the interest of buyer and seller centered around the release of contract prices and the signing of '39 contracts. At the close of the month practically all of the contract renewals were in the hands of suppliers.

Some interesting price changes, however, became known in the past 30 days. The '39 domestic crude naphthalene price schedule shows a decline from previous price levels. The new price for 74° material is $2.25 in carlots, bags, a decline of 10c per 100 lbs. There was very little demand for deliveries, but some improvement from refiners is anticipated shortly. The domestic price schedule on cresylic acid, released early in the month, showed a 10c decline in high-boiling grade, to a basis of 63c, and a 9c reduction in low-boiling material, to a basis of 69c. Severe competition between imported and domestic was the chief reason for the sharp break.

U. S. P. cresol was also reduced. The decline amounted to ½c, and the new carload price in drums, f.o.b. sellers' works, is 10c, with a ½c differential for l.c.l. quantities. Special resin grade was reduced ¼c, and is now quoted at 9c per lb. Quotations for paracresols were extended for the first 6 months of '39, but metacresols were down 2c.

Higher prices were asked for pyridine because of scarcity of material. The denaturing grade was advanced 10c to $1.63 per gal., and the refined was "upped" 5c to 50c per lb. Tar acid oils were lowered for the next 6 months, the 15% material being down 1c to a basis of 21c in carlots, while the 25% material was reduced ½c to 25c per gal. The last important price change of the month was one of 3c on the downward side for dimethylaniline. The new carlot quotation is 23c.

Generally speaking, aside from the changes mentioned above, contract prices for the first half of '39 on the important coal-tar solvents, crudes, intermediates, acids, and colors are the same as in the last part of '38.

A slight falling off in the demand for solvents was reported in the closing 10 days of December. However, the coatings industry is much more active than it was at the corresponding period a year ago, so that the outlook for the consumption of coal-tar solvents is favorable. Dye sales have been maintained at very satisfactory levels and the principal producers look forward to even heavier consumption over the first few months of '39. The plastic field is showing definite signs of improvement and this means larger consumption of phenol.

Important Price Changes

	Dec. 31	Nov. 30
ADVANCED		
Pyridine, denat.	$1.63	$1.53
ref'd 2°	.50	.45
DECLINED		
Acid cresylic, H. B., dom.	$0.63	$0.73
L. B. dom.	.69	.78
Cresol, U. S. P.	.10	.10½
resin grade	.09	.09¼
Dimethylaniline	.23	.26
Naphthalene, crude, dom., 74°	2.25	2.35
78°	2.50	2.75
Tar acid oil, 15%	.21	.22
25%	.25	.25½

November Coking Operations Up

November coking operations continued the upward swing in operations started in the middle of '38. Output amounted to 3,277,523 tons, as against 3,092,806, a gain of 6%. On a daily basis, the gain over October was 9.5%. Output in November of '37 was 3,222,300 tons, and for the first 11 months of '38 the volume was only 28,433,047 tons, as compared with 46,387,000 in the like period of '37.

Benzol production in November reached 7,619,000 gals., as against 7,100,000 in October, a gain of 7.3%. November, '37 production totaled 7,472,000 gals. In the first 11 months of '38 the output of benzol reached only 63,560,000 gals., comparing unfavorably with 110,674,000 in the like period a year earlier.

Light oil production during November totaled 13,450,153 gals., as against 12,688,033 in the preceding month and 13,308,576 gals. in November of '37. For the first 11 months of '38 production totaled 117,321,927 gals., as compared with 192,861,157 gals. in the corresponding period of '37.

Tar production was reported at 40,951,327 gals., as compared with 38,630,920 in the previous month and 40,520,295 gals. in November of '37. For the first 11 months output totaled 356,625,437 gals., as against 587,188,264 gals. in the like period of a year earlier.

Why Industrial Research

How to keep customers dissatisfied constitutes one reason for industrial research according to an article in the January issue of *Priorities*, published by Prior Chemical Corporation, New York. Typical examples of other and more important functions of research are given, such as finding uses for waste by-products, improving processes and making use of cheaper materials, all resulting in lower prices or better goods or both. Some of the wholly new products evolved from research are discussed as are certain synthetic products which free us from dependence on imports. Figures are given indicating the vast amount of research carried on by private industry and the article stresses the extent to which such research is providing better living and increased employment. The question is also raised as to the social benefits that might accrue if the same scientific spirit of finding indisputable facts and being guided by them which prevails in the laboratory were applied in other human affairs such as legislation.

New Ethyl Cellulose Plant

The first step in an expansion program for the manufacture of ethyl cellulose was announced Dec. 8 by officials of Hercules Powder. Work will begin at once on the construction of a new ethyl cellulose plant at Hopewell, Va.

At the present time, Hercules ethyl cellulose is manufactured in a plant at the Hercules Experiment Station, near Wilmington, Del. Transfer of all ethyl cellulose manufacturing activities to Hopewell will be made as soon as the new plant is completed. The new unit provides Hercules with increased production facilities to keep pace with the growing demand for ethyl cellulose.

According to Mr. M. G. Milliken, general manager of the Cellulose Products Dept., Hopewell will prove an ideal location for the manufacture of ethyl cellulose.

First Newsprint Mill

Construction work on the South's first newsprint mill, at Lufkin, Tex., started early in January, according to an announcement by E. L. Kurth, of Lufkin, president of the new Southland Paper Mills, Inc.

Southern newspaper publishers have contracted for the entire output of the mill for a period of 5 years at Canadian prices. Such action was taken, the publishers stated, in order to foster the Southern newsprint industry. Engineers estimate that the new Southern mill will be able to manufacture newsprint at a lower cost than is now paid for imported newsprint.

Heralded as the first of many newsprint mills which will use the vast forest resources of the South, the Lufkin plant and lands will cost $6,000,000.

Solvents and Plasticizers

Carbon "Tet" Quoted on Gallon Basis

Dow Chemical Introduces New Method of Pricing—Diacetone Prices Reduced Sharply—Tank Car Prices for V. M. & P. Naphtha and Rubber Solvent in N. J. Down ½c.

Important Price Changes

	Dec. 31	Nov. 30
ADVANCED		
Methanol, denat. grade, tanks	$0.35	$0.25
drs.	.40	.30
DECLINED		
Alcohol, diacetone, A.F. tanks	$0.08	$0.10½
drs.	.09	.11½
Tech, tanks	.07½	.09½
drs.	.08½	.10½
Ethyl acetate, 85% tanks	.051	.055
drs.	.061	.066
99% tanks	.0585	.0545
drs.	.0685	.0645
Methyl acetate, 97-99% drs.	.07¼	.08
tanks	.06¼	.07
Naphtha, V. M. & P., tanks, N. J.	.09	.09½
Rubber solvent, tanks, N. J.	.09	.09½

Alcohol Users to Meet

Plan of the Industrial Alcohol Institute to promote the organization of a council of users of industrial alcohol has been crystallized in an invitation to representatives of such users to attend a luncheon in the Chemists' Club, N. Y. City, at 1:00 p.m., Jan. 24. Stated purposes of the luncheon meeting are discussion of the need for close watch on State legislation directed to the control of alcohol for nonbeverage use, and the possibility of organizing for this purpose a "Council of Industrial Alcohol Users."

Methanol Production

November crude methanol production amounted to 344,328 gals., as compared with 335,380 in October and 423,315 in '37. Synthetic production in November amounted to 2,617,979 gals., as compared with 2,294,532 in October of '38 and 3,532,091 in November of '37. Comparative 11-months figures are given below:—

	Synthetic	Crude
1938	23,186,920	3,812,847
1937	27,926,305	5,292,056

Penn. Chemists Organize

A group of prominent Pennsylvania chemists on Dec 14 received a charter as "The Pennsylvania Chemical Society." The president is Dr. Joseph W. E. Harrisson, consulting chemist, member of the firm of La Wall & Harrisson of Philadelphia. Vice-President is Dr. Nelson W. Taylor of Penn State. Secretary and treasurer is Dr. Elliott P. Barrett, member of the staff of Mellon Institute.

Schappa Promoted

Walter J. Schappa has been appointed manager, export division of the Grasselli chemicals department of du Pont, Empire State Bldg., N. Y. City.

A slight, temporary lull was experienced in the solvents markets in the last half of December. This was viewed by producers as being only seasonal. With the turn of the new year immediate expansion of volume was looked for. The automotive and rubber industries are expected to immediately step up production schedules, but the peaks are not expected until sometime in February.

Price changes in the petroleum solvents were relatively few. The tankcar price of v.m.&p. naphtha in New Jersey was reduced ½c per gal., to a basis of 9c. A similar reduction was made in the same area for rubber solvents. The N. Y. market was not affected by these revisions, nor did they spread to other petroleum products in the New Jersey area. The midcontinent price structure held firm and unchanged in the period under review.

A downward revision in diacetone prices became effective on Jan. 1. The acetone-free material is now quoted at 8c in tanks and 9c in carlots, drums. The technical grade is quoted at 7½c in tanks and 8½c in drums in carlot quantities. These prices are f.o.b. destination, containers included and not returnable.

The denaturing grade of methanol was treated to another price advance, this one of 4c a gal. The tankcar price on the item now is 35c.

The quotations for spot and contract deliveries of ethyl acetate and methyl acetate were revised lower in the past month. The decline in ethyl acetate amounted to 4/10c and the new schedule is:—85% drums, carlots, freight allowed, 6.1c per lb.; less carlots, same basis, 6.6c per lb. and tanks 5.1c per lb.; 99%, drums, carlots, freight allowed, 6.85c; less carlots, same basis, 7.35c and tanks, 5.85c. Quotations are for Eastern territory only.

Quotations for 97-99% methyl acetate were lowered ¾c per lb. Quotations are now:—Carlots, drums, east of Mississippi, 7¼c per lb.; less carlots, drums, 7¾c per lb. and tanks, 6¼c per lb. Prices west of the Mississippi are generally 1c higher. Above prices are f.o.b. producing points, freight allowed on single 55-gal. drums or more to city of destination.

Revised "Tet" Prices

Effective Jan. 3, a new schedule on carbon tetrachloride comprising a revised unit base for prices quoted will prevail, the quotations are on a per gal. basis instead of per lb. as heretofore. A 4 zone system has been set up for the freight allowed prices quoted. The new schedule follows:—Zone 1—52½ gal. drums, carlots, 66½c per gal., less carlots, 73c per gal.; 5/10 gal. drums, carlots, 90c per gal., less carlots, $1 per gal. Zone 2—52½ gal. drums, carlot, 73c per gal., less carlots, 80c per gal.; 5/10 gal. drums, carlots, 97c per gal., less carlots, $1.07 per gal. Zone 3—52½ gal. drums, carlots, 80c per gal., less carlots, 86c per gal.; 5/10 gal. drums, carlots, $1.03 per gal., less carlots, $1.13 per gal. Zone 4—52½ gal. drums, carlots, 83c per gal., less carlots, 90c per gal.; 5/10 gal. drums, carlots, $1.07 per gal. and less carlots, $1.17 per gal. All prices are freight allowed with the exception of zone 4 in which case the prices indicated are based on f.o.b. cars, Los Angeles, California; San Francisco, California; Portland, Oregon and Seattle, Washington. All packages are inclusive and not returnable. Zone 1 includes the following states:—Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island, New York, New Jersey, Pennsylvania, Maryland, Delaware, Virginia, West Virginia, North Carolina, Tennessee, Ohio, Indiana, Michigan, Illinois, Wisconsin, Minnesota, Iowa, Missouri; also the river towns of Burlington, Iowa and Kansas City, Kansas. Zone 2 includes the states of North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, Arkansas, Louisiana, Mississippi, Alabama, Georgia, South Carolina and Florida. Zone 3 includes that portion of Montana, east of Billings and the states of Wyoming, Colorado, New Mexico and Texas. Zone 4 includes the states of Washington, Idaho, Montana, Oregon, California, Nevada, Utah and Arizona.

November Alcohol Output Off

Production of ethyl alcohol showed a decline in November from the like month of '37, the respective figures being 15,163,681 and 18,179,322 proof gallons. A sharp drop was shown in output of completely denatured also, the respective figures being 2,827,108 and 4,127,663 wine gallons. Total removed in November amounted to 2,989,361 gals., as against 4,266,405 in the like month of '37. Stocks on Nov. 30, '38, were reported at 433,238 gals., compared with 564,671 on Nov. 30, '37.

Statistics on specially denatured were more favorable. November production was 7,367,630 gals., against 5,480,908 in the like month of '37. Total removed for November '38 was 7,319,801 as against only 5,685,569 in the corresponding month of the year previous. Stocks on Nov. 30 were reported as being 799,477 gals., as compared with 555,036 on Nov. 30, '37.

Agricultural Chemicals

Little Interest in Raw Fertilizer Materials

Natural Ammoniates Higher in Price—Sulfate, Nitrate, Potashes and Phosphates Quiet—Rise in November Tag Sales—More Optimism as Active Mixing Season Approaches—

Dullness still characterized the markets for raw fertilizer materials during the past month, but expansion in interest and trading was momentarily expected. The active mixing season is now close at hand and the outlook while still quite uncertain, seems to be much better than it was 60 days ago.

The natural ammoniates were in somewhat better demand and prices for dried blood and tankage, both imported and domestic, made several price gains. There is now talk in the industry that spot stocks of these items are now scarce and in many quarters the price tone is extremely bullish.

As a routine matter the price of sulfate of ammonia on Jan. 2 went to $28.00 per ton for January-June delivery, an increase of 25c per ton over the December quotation. Trading in the product was light during most of the month. Stocks are not now as scarce in certain sections as they were a few months ago. Trading in the potashes and phosphates was seasonally slow.

Japanese sardine meal was a strong item. Several separate increases brought quotations for future deliveries to $48.50 per ton. The domestic fish meal market was quiet with prices generally nominal.

November Tag Sales Rise

Sales of fertilizer tax tags were 19% larger than in '37, due in a large part to unusually heavy sales in Georgia. Sales in the midwest are usually at the year's low point in November, accounting for only 0.1% of the annual total, against a ratio of 2.3% in the South. Total November sales in 17 reporting states totaled 146,872 tons, as against 123,466 in the like month of '37 and with only 99,916 in the same month of '36.

For the first 11 months of the year total sales were 11% below the same period of '37, with Oklahoma and Kansas the only states reporting increases. There was a drop of about 230,000 tons in the amount of fertilizer used on cotton from '37 to '38, a decline of 13%, while cotton acreage fell off 22%. Offsetting the sharp decline in acreage were increases in the proportion of acreage fertilized and in the rate of application. Average rate of application when used, was 282 lbs. per acre, apparently the highest on record, but the average cost per acre was slightly lower than in '37, $3.63 against $3.68, reflecting a decline in prices.

October Exports Below Last Year

October exports of fertilizers and fertilizer materials totaled 134,929 tons valued at $1,820,858. Shipments were well below October of last year, with exports of land pebble phosphate rock less than half as large as a year ago. Nitrogenous materials were also exported in smaller quantity. There were increased exports of hard rock, superphosphate, and potash.

In the first 10 months of the year total exports were somewhat above the like period of '37 but less than two years ago. Declines in ammonium sulfate and potash have been offset by larger exports of phosphatic materials and synthetic sodium nitrate.

Imports of Chilean nitrate, which were running at a relatively low level in the first part of the year, have increased substantially in recent months. Such imports were responsible for the total tonnage of materials imported in October being above last year's figures. There was another large shipment of Peruvian guano brought in. The decline in potash imports continued in October. Total imports amounted to 156,034 tons, valued at $3,994,239. Imports in the January-October period have been off some 400,000 tons from the like '37 period, with nitrogenous materials off 55,000 tons, phosphatic materials 60,000 tons, and potash 285,000 tons.

Gain in Sulfate Output

November sulfate of ammonia production at byproduct plants amounted to 44,985 tons, as compared with 42,005 tons in October, a gain of 7.1%. Production in November of '37 totaled 50,234 tons. For the first 11 months of '38 output reached only 390,299 tons as against 733,700 in the like period of '37.

So. Sulfur Rates Withdrawn

The railroads have withdrawn their proposed increased rates on sulfur in Southern territory which were filed to become effective on Nov. 5, 1938, but which were under suspension pending a hearing before the I. C. C. on Jan. 10, 1939, I. & S. 4547. Strong representations were made to the carriers by the members of the traffic committee of the National Fertilizer Association to withdraw these rates.

Sulfur In '39

The sulfur industry, which in 1938 saw the opening of greater fields of usefulness in industry, agriculture, public health and medicine, and important developments with respect to taxation, looks forward to 1939 with confidence, in the opinion of Langbourne M. Williams, Jr., president, Freeport Sulphur Co.

Important Price Changes

	Dec. 31	Nov. 30
ADVANCED		
Ammonium sulfate	$28.00*	$27.75
Blood, dried, imp.	3.00	2.90
N. Y.	3.25	3.10
Chicago	3.50	3.30
Bone Meal, imp.	22.50	21.50
Calcium phosphate, dibasic	.80	.78
Fish scrap, Jap.	48.50	45.00
Tankage, grd.	3.25	3.00
ungrd.	3.25	3.00
Chicago	3.50	2.75
Imported	3.10	3.00
DECLINED		
Bone, raw, dom., N. Y.	$27.00	$28.50
Nitrogenous mat., midwest	2.20	2.25

* Effective Jan. 1, '39.

Personals

A. Cressy Morrison was re-elected president of the N. Y. Academy of Sciences for 1939 by unanimous vote at the 120th annual dinner meeting of the academy held recently at the Astor.

A gift of $45,000 from Harry G. Haskell, a vice-president of du Pont, to carry on special research in diseases of cattle, was announced Dec. 10 by the board of trustees of the University of Delaware.

The 70th birthday of O. Hommel, president of O. Hommel Co., Pittsburgh chemical distributor, was celebrated at a dinner held Dec. 3 at the Wm. Penn Hotel in Pittsburgh.

H. Fred Fisher, technical laboratory colorist and dyestuffs application technician of the Deepwater plant of du Pont, has been temporarily assigned to the export division and sailed for Colombia, South America, on Dec. 20.

The degree of Doctor of Science, honoris causa, has been conferred by the University of Oxford, England, upon Dr. Irving Langmuir, director of research for General Electric.

Clinton H. Crane, president, St. Joseph Lead Co., was tendered a dinner recently at the Racquet and Tennis Club, N. Y. City, in celebration of his 25 years of service as president of the company. Before joining "St. Joe," he was a naval architect. During the World War, Mr. Crane headed the Lead Industries Board.

Dr. Stanford L. Hermann, chief research chemist, and son of Dr. S. M. Hermann, president of the Apex Chemical Co., was married on Dec. 29 to Miss Sylvia Beatrice Klarsfeld, daughter of Mr. and Mrs. Jerome R. Klarsfeld of N. Y. City. After a wedding trip to California and Honolulu, Dr. & Mrs. Hermann will reside in Elizabeth, N. J.

Natural Raw Materials

Hand-to-Mouth Buying in Raw Materials

Bayberry and Candelilla Waxes Higher—Japan Wax Firm—Carnauba Lower—Shellac Quiet—Routine Trading in Natural Tanstuffs—Firmer Tone in Naval Stores—

The markets for natural raw materials reflected the holiday and inventory period of the past month, yet the volume of business was quite satisfactory when comparison is made with the corresponding month of '37. Of course, it must be remembered that 12 months ago commodity prices were in the midst of one of the sharpest declines in history. Buyers were in a panic and not only were not buying but on a great many items were fast becoming sellers in an effort to change commodities into cash. An entirely different situation prevails now. Commodity prices have held at fairly steady levels for some months. There is lacking, of course, the incentive to heavy forward purchasing. However, consumption is steadily increasing and buyers' requirements are increasing in even greater proportion because there is some tendency to accumulate stocks when business generally is on the upturn.

The wax markets provided a considerable part of the interesting news in the past 30 days. After many months of price stability, bayberry was advanced sharply to a basis of 18½c-19c. Demand has been good and stocks are below normal. Candelilla prices were also higher at 15½c-16c. The producers at the primary source have succeeded in exercising complete control. Japan wax prices were unchanged from recently published levels, but a much firmer tone was in evidence. The outlook appears to be towards higher prices.

On the downward side, lower prices were in evidence for crude yellow African beeswax and for all grades of Carnauba. The new crop is now arriving at shipping ports in Brazil and in large quantities, hence the weakness in the item. The opinion is expressed in some quarters that still further concessions will be made. Current demand is said by importers to be unsatisfactory.

Shellac, Varnish Gums Quiet

The shellac market was without any appreciable change from former conditions. While spot and contract deliveries were light, they were just about normal for the holiday period. Prices were unaltered.

The natural gums were quiet in the period under review. Buyers temporarily showed very little interest in any appreciable amount of forward purchasing. Most of the price changes were largely the result of shifts in exchange and did not represent any fundamental shift in the price structure in the primary markets. The Singapore gums underwent price decline last month. No. 1 grading was off ⅜c per lb. to the basis of 15¼c; No. 2 declined ⅜c per lb. to 11¼c; chips were lowered 1⅜c per lb. to 9¼c, and seeds were off ⅜c per lb. to 7⅜c. These prices were for carload amounts and subject to usual differentials for smaller lots.

Tanstuffs Steady

A fair amount of inquiry was noted for the natural tanstuffs and dyestuffs. Deliveries against existing contracts over the past few months have been quite satisfactory, but momentarily there has been a lull in forward buying. The seasonal lull in manufacturing operations in textile and tanning was not as great as was generally anticipated. This fact seems to be excellent assurance that production in these fields will be stepped up sharply during January. Prices for Philippine cutch, gall and spruce extracts have been extended.

Higher Rosin, Turpentine Prices

A somewhat firmer tone was noted in naval stores in the past 30 days, despite the fact that trading was light. Buyers and sellers are largely marking time, awaiting the outcome of the efforts of the committee that is working in Washington trying to get sufficient loan funds for the entire period of the next naval stores year. A comparison of prices at Savannah on Nov. 30 and Dec. 29 follows:

	Nov. 30	Dec. 29*	Net Gain or Loss for Month
B	$3.50	$3.70	+$0.20
D	3.50	3.90	+.40
E	4.05	4.00	—.05
F	4.20	4.25	+.05
G	4.35	4.35	—
H	4.35	4.35	—
I	4.35	4.37½	+.02½
K	4.35	4.40	+.05
M	4.35	4.50	+.15
N	5.25-5.40	5.50	+.25
WG	5.75	5.90	+.15
WW	6.30	6.50	+.20
X	6.30	6.50	+.20
Turpentine	.21	.23	+.02

* Last trading day.

Establishes New Fellowship

Dr. Edward R. Weidlein, Director, Mellon Institute, announces establishment of an Industrial Fellowship in that institution by U. S. Gypsum, Chicago, Fellowship will conduct fundamental research on various products manufactured by the donor company, with the objective of developing new processes and technics which will have broad application in the field of building materials. This investigational work will augment the regular research activities carried on by the donor.

Dr. H. E. Simpson, who has been appointed to the incumbency of the Fellowship, has been a member of Mellon since '36.

Important Price Changes

ADVANCED

	Dec. 31	Nov. 30
Myrobalans, J1	$24.00	$23.50
Sumac, leaf	73.00	70.00
Wax, Bayberry	.18½	.16⅞
Candelilla	.15½	.15¼

DECLINED

	Dec. 31	Nov. 30
Rottenstone, dom.	$22.50	$35.00
Sumac, grd., Italian	37.00	38.00
Valonia cups, ship.	30.00	31.00
Wattle bark, ship.	36.00	36.50
Wax, Bees, yellow African	.19	.20
Carnauba No. 3 chalky	.29	.31
No. 2, N. C.	.34	.35½
No. 3 N. C.	.30	.31½
refined	.35	.36½
No. 1 yellow	.39	.40½
No. 2 yellow	.38	.39
Zinc dust	.06½	.06¾

France Heads Gum Importers

T. J. France, of France, Campbell & Darling, Inc., is the new president of the American Gum Importers' Association. Mr. France succeeds Hendrick E. Hendrickson, of S. Winterbourne & Co., who retired after 8 successive terms of office. O. G. Innes, O. G. Innes Corp., was chosen vice president, and John Young, of Gillespie-Rogers-Pyatt, was elected secretary-treasurer. The officers together with A. Scharwachter, American Cyanamid, and Michael Fried, of William H. Scheel, Inc., constitute the board of directors.

Saxe Cutch Corp. Formed

A new corporation has been formed under the name of Saxe Cutch Corp. to take over the sale of Borneo cutch in the U. S. and Canada. For the past 20 years this business has been handled under the name Sig. Saxe.

Officers of the new corporation are: Sig. Saxe, president; Alexander Saxe, vice president; Edward J. Kenney, secretary. The same N. Y. City headquarters will be maintained.

Beaumont Conference

Regional conferences under the auspices of National Farm Chemurgic Council will play an important part in the '39 Chemurgic program as now being planned by the officers and staff. The first of these conferences will be held at Beaumont, Tex., Feb. 10 and 11. Cellulose and vegetable oils will be featured topics of discussion. The Beaumont Chamber of Commerce will be host to the conference.

J. F. Mitchell-Roberts, export manager for Oliver United Filters, Inc. (N. Y. City, Chicago and San Francisco) has just returned from a two-year trip which took him around the world.

Fats and Oils

Chinawood Oil Advanced

Fats and Oils Markets Quiet—Refined Fish Oils Quoted at Higher Levels—Perilla Firm—Stearic Acid Off ½c—Light Trading in Coconut—Soybean Steady—

The oils and fats markets were generally quiet in the period under review. There were more than the usual number of inquiries about, but actual purchasing was largely of the hand-to-mouth variety. Buyers, however, were keen to note a stiffening in the general price structure and this led to the unexpected increase in "feelers" on prices for future deliveries.

A slightly higher price level was in effect at the end of the month for Chinawood oil. Sales, however, were few and far between with buyers employing a very cautious attitude. Importers also are more than careful. The news from China is still of such a nature that there are no definite assurances of the regularity of shipments. Purchasing on a broader scale is expected in the last half of January when the paint producers start on their spring season manufacturing.

The decided firmness in the refined fish oils carried over into December and again higher quotations were announced for the various grades of menhaden and sardine.

Oleo was to be had at concessions from the November price levels. Corn oil was slightly higher. Decided firmness characterized the market for perilla. A slightly higher market for linseed was noted. Soybean prices held firm at unchanged price levels. It is of more than passing interest to note that soybean oil prices have shown remarkable stability for many months. This fact alone is attracting many oil users to investigate its possibilities.

The market for coconut was quiet, but the price tone remained firm. It was reported that buyers were offering 3c, but that importers were holding steadily for higher prices.

A ½c reduction in stearic acid prices was made about the middle of the month. A fair quantity was said to be moving into consuming channels against existing contracts, but spot inquiries and sales were disappointing to suppliers.

November Cotton Oil Use

Consumption of cottonseed oil during November totaled 263,024 bbls. and was in line with trade expectations. The official figure on consumption for October was 281,028 bbls. Since August, 1938, cotton oil consumption amounts to 1,136,289 bbls., against 1,638,821 for the same period last year.

Principal reason for falling consumtion are cheapness of lard and other edible oils.

Oiticica Imports

Oiticica oil, which is obtained solely from Brazil, has been increasing in importance during recent years. There are 14 concerns engaged in the manufacture and supply of oiticicia oil in Brazil, according to the Bureau of Foreign and Domestic Commerce, practically all of which are located in the state of Ceara. Some of the firms, however, are situated in the states of Pernambuco, Parahyba, and Piauhy. Imports of oiticica oil into the U. S. for '36, '37, and the first 8 months of '38 are given below:

Year	Pounds	Dollars
1936	2,892,137	315,509
1937	3,631,147	376,829
1938 (8 Mo.)	2,196,446	180,561

Obituaries

George Charles Lewis, 64, president and director of L. Martin Co., N. Y. City, factor in lampblack, on Dec. 19 following a heart attack.

Mr. Lewis, a British subject, was a former president of the Chemists' Club of N. Y. Born in Bombay on Aug. 5, 1874, he was educated in England, came to the U. S. in 1904 and joined the Martin firm.

Mr. Lewis was a member of the Pilgrims, past president of the British Schools and Universities Society and an officer in the British Naval Reserve. He also held membership in the St. Georges Society of N. Y. and in Montauk Lodge (Brooklyn), F. and A. M. He was credited with 21 inventions in connection with lampblack.

Other Deaths of the Month

Charles A. Latimer, president of the Goodwin-Latimer Chemical Co., well-known Western chemical distributor, on Dec. 14, at his home in Grand Junction, Colo.

J. Frank Carey, 41, responsible for the invention recently of a fast-drying color ink, and president of Frederick H. Levey Co., Philadelphia ink manufacturer, on Dec. 16. He served with the Marines during the World War.

Joseph R. Oppenheimer, West Disinfecting Co., Long Island City, and prominent in the affairs of the National Association of Insecticide & Disinfectant Manufacturers, on Dec. 19.

Dr. Albert H. Krause, 70, an outstanding figure in the chemical industry for nearly half a century and general acid superintendent for American Agricultural Chemical at Cleveland, died suddenly on Dec. 20 at his home.

Augustus R. Laucks, 67, general superintendent of the Textile Chemical Co., Reading, Pa., on Dec. 23.

Walter W. Ogier, Jr., 41, executive vice-president, Pure Carbonic, on Dec. 23, following an attack of pneumonia.

Important Price Changes

	Dec. 31	Nov. 30
ADVANCED		
Oil Chinawood, drs.	\$0.15½	\$0.14½
tanks	.15	.14
Corn, crude, tanks	.06½	.06⅜
Lard, common 1, bbls.	.08¾	.08½
No. 2, bbls.	.08½	.08¼
Linseed, boiled, tanks	.083	.082
Menhaden, crude	.32	.30
ref'd alkali, tanks	.0710	.067
blown, drs.	.0770	.073
kettle-bodied, drs.	.086	.082
light pressed, tanks	.065	.061
Olive, denat.	.92	.86
Olive, foots	.07⅛	.07
Palmkernel, ship.	.0340	.0325
Sardine, crude	.31	.30
ref'd alkali, tanks	.071	.067
kettle-bodied, drs.	.086	.082
light-pressed, tanks	.065	.061
DECLINED		
Oil Oleo No. 1, bbls.	\$0.08½	\$0.09
No. 2, bbls.	.07¾	.08¼
Red, distilled, bbls.	.07⅜	.08⅜
tanks	.06½	.07½

Virgil Homer Hunter, 59, manager of the N. Y. office of the Werner G. Smith Co., Cleveland, on Dec. 24.

Dr. William B. D. Penniman, 72, a member of the firm of Penniman and Brown, Baltimore, on Dec. 17. He was one of the best known analytical chemists in the country.

Walter Glensmann, 28, Cyanamid research chemist at the Stamford, Conn., research laboratories, was killed on Dec. 12 in an explosion that seriously injured two other chemists.

William Robbins Seigle, 59, chairman of the board of Johns-Manville Corp., on Dec. 26 in a hospital at Rochester, Minn. He was also director of research for the company.

Dr. Lloyd Logan, 47, head of the chemical engineering dept., Syracuse University, on Dec. 29, following a long illness.

Charles R. Buerger, 51, vice-president of the Gulf Oil Corp., on Jan. 3. He had been ill with a streptococcus infection for several months. He was considered an outstanding authority on oil refining equipment.

James N. Drake, 55, founder of the Bennettsville Fertilizer Manufacturing Co., Bennettsville, S. C., on Dec. 15, following a heart attack. He had been connected with the fertilizer industry for nearly 30 years.

Dr. William John Gascoyne, 82, president of the consulting firm of Gascoyne & Co., Baltimore, on Dec. 27, following an attack of pneumonia. He was widely known in the fertilizer field.

Dow Chemical has made application to the N. Y. Stock Exchange for the listing of an additional 86,988 shares of no par value common stock.

Pigments and Fillers

Carbon Black Advance Fails to Hold

Titanium Dioxide Reduced 1c—Casein Continues to Advance—Mercury Colors Go Higher—Lead Pigments React—Paint, Coatings Outlook Favorable For Spring—

Important Price Changes

ADVANCED	Dec. 31	Nov. 30
Casein, 20-30	$0.08½	$0.08
80-100	.09	.08½
Mercury oxide, Red, tech.	1.36	1.26
yellow, tech.	1.31	1.21
DECLINED		
Lead, red, dry 95%	.07¼	.07½
97%	.07½	.07¾
98%	.07¾	.08
Litharge	.06¼	.06½
Lithol toner	.68	.75
Orange mineral	.10¼	.10½
Rottenstone, dom.	22.50	35.00
Titanium dioxide, bgs.	.14	.15
bbls.	.14½	.15½

Reichhold Buys Lavanburg

It has been officially announced that H. Reichhold, president of Reichhold Chemicals, Inc., Detroit, recently acquired stock control of the Fred L. Lavanburg Co., Brooklyn, N. Y., manufacturers of chemical pigments since 1886.

While no official announcement of the details has been issued, it is understood that few changes will be made in the personnel of the Lavanburg organization so far as the sales and manufacturing groups are concerned. Reorganization of the executive staff, however, will take place at an early date and full particulars will be published in a subsequent issue, together with a revised list of the sales agents and representatives.

To many who have long known of Mr. Reichhold's interest in the color division of the paint industry, the acquirement of the Lavanburg plant is not at all surprising. His initial experience in the industry was with a European producer of dry colors, which was followed immediately by a term of tinting, color matching, etc., with an American manufacturer.

The backing of Lavanburg's half a century of experience and reputation for quality with a Reichhold plan of aggressive sales, service and research should, in time, increase the popularity of Lavanburg colors to a point where they will, in the not too distant future, be among the leaders in the field of chemical colors.

Lewis Appoints North

John D. Lewis, Inc., Providence, R. I., appoints Dr. W. B. North distributor of its synthetic resins, and ester gums in N. Y. City, New Jersey and Philadelphia. He will maintain headquarters in the Industrial Office Bldg., Newark, N. J.

To Head Nylon Plant

Emile F. du Pont has been made manager of the new nylon plant of du Pont at Seaford, Del.

The markets for raw coatings materials in the final month of the year were seasonally quiet, although the volume was quite satisfactory when comparison is made with the figure for December of '37.

The advance in carbon black, announced in the last issue, failed to hold. As a result, the item will be marketed at least for the first 6 months at no advance over the extremely low price that has prevailed since the "price war" of '37.

Producers of titanium dioxide at the end of December announced a 1c reduction, bringing the carlot bag price to 14c and the carlot barrel price to 14½c. These prices are on a delivered basis and only are effective east of the Rocky Mountains. Prices for titanium dioxide white pigments are unchanged. Contracts for lithol toner are being written on a quarterly basis at 68c. The open market quotation is 73c. Other toners, iron blues, zinc yellow, Hansa yellow, alkali blue and other colors are being quoted for the year on a quarterly basis, unchanged from '38 prices.

The market for casein continues to gather strength. Production is said to be below normal, while demand has increased quite substantially in the last 60 to 90 days. An advance of ½c was made in December, bringing the price for 20-30 mesh to 8½c and for 80-100 mesh to 9c.

The recent strength in quicksilver was reflected in higher quotations for the technical mercury oxides. Technical red was raised 10c to $1.36 per lb., and yellow was advanced a similar amount to $1.31.

Lead prices weakened in the second week of December. A $3 decline on Dec. 6 and a $2 drop on Dec. 9 brought the N. Y. market to 4.75c and the E. St. Louis market to 4.60c. The last break was the third within a period of two weeks and forced a ¼c decline in dry red lead, and similar losses in litharge and orange mineral. No change was made in white lead. Somewhat later in the month the market for the metal took on a more bullish tone, but the rise was so slight that it did not bring about any revision in lead pigment prices.

Manufacturers of driers (stearates and palmitates) announced late in December that they would negotiate contracts with prices unchanged for the first quarter. No contract announcement on ester gum prices was made up to the end of the year. Some price weakness was noted.

Varnish gums were in very light demand in the past 30 days. Prices for several of the more important types and grades were off from November quotations. Much of the price weakness is attributed to problems of exchange. Cables from primary sources seem to indicate quite a degree of firmness.

While immediate trading in raw paint materials was quite dull, suppliers are greatly encouraged over the outlook for '39. Contracts in many instances specify much larger quantities than they did a year ago. Paint manufacturers are looking forward to a heavy spring season, while the coatings makers supplying such industrial fields as the automotive and furniture, expect important increases.

Construction Outlook Bright

The year '38 was the 5th consecutive year of increased construction volume, according to F. W. Dodge Corp. Residential building had the largest dollar total since '30, and total building and engineering expenditures were practically equal to those of the year '31 and greater than any year since '31. While public construction expenditures represented 52% of last year's total volume, privately-financed building and engineering work was greater than in any post-depression year except 1937. Private construction during '38 ran 16% behind '37, but 10% greater in volume than in '36. Significant increases in private construction contracts accompanied the mounting volume of public works projects in the closing months of 1938.

Contracts awarded from Jan. 1 through Dec. 21, 1938, in the 37 Eastern states, amounted to $3,054,417,000, compared with $2,861,993,000 in the corresponding period of 1937.

Sentiment in the construction industry is reported as quite optimistic regarding the first half of '39, and generally hopeful but somewhat uncertain as to what may happen in the later months of the year.

Offers Journalism Prizes

Dr. Godfrey L. Cabot, president of Godfrey L. Cabot, Inc., Boston manufacturer of carbon black, has provided Columbia University Pulitzer Graduate School of Journalism with funds for the establishment next year of 2 to 5 annual prizes in journalism aimed at building up sympathetic understanding among the peoples of South, Central and North Americas. They are to be known as the Maria Moors Cabot Prizes.

Damen to Boston

Wishnick-Tumpeer, Inc., manufacturers of chemicals, oils and pigments, appoints C. A. Damen, formerly of its N. Y. office, as manager of its Boston branch at 141 Milk st.

Prices Current

Heavy Chemicals, Coal-tar Products, Dye-and-Tanstuffs, Colors and Pigments, Fillers and Sizes, Fertilizer and Insecticide Materials, Petroleum Solvents and Chemicals, Naval Stores, Fats and Oils, etc.

Chemical prices quoted are of American manufacturers for spot New York, immediate shipment, unless otherwise specified. Products sold f. o. b. works are specified as such. Import chemicals are so designated. Resale stocks when a market factor are quoted in addition to maker's prices and indicated "second hands."

Oils are quoted spot New York, ex-dock. Quotations f. o. b. mills, or for spot goods at the Pacific Coast are so designated.

Raw materials are quoted New York, f. o. b., or ex-dock. Materials sold f. o. b. works or delivered are so designated.

The current range is not "bid and asked," but are prices from different sellers, based on varying grades or quantities or both. Containers named are the original packages most commonly used.

Purchasing Power of the Dollar: 1926 Average—$1.00 - 1937 Average $1.10 - Jan. 1938 $1.20 - Dec. 1938 $1.25

	Current Market		1938 Low	1938 High	1937 Low	1937 High
Acetaldehyde, drs, c-l, wks lb.	...	.14	...	.14	...	.14
Acetaldol, 95%, 50 gal drs wks ...lb.	.21	.25	.21	.25	.21	.25
Acetamide, tech, lcl, kegs ..lb.	.39	.43	.32	.43	.32	.43
Acetanalid, tech, 150 lb bbls lb.	...	.29	.29	.32	.24	.29
Acetic Anhydride, drs, **f.o.b. wks, frt all'd** .....lb.	.10½	.11	.10½	.11	.13	.15
Acetin, tech, drs ...lb.	...	.33	...	.33	.22	.33
Acetone, tks, f.o.b. wks, frt all'd ...lb.	...	.04¾	...	.04¾	.04¾	.06½
drs, c-l, f.o.b. wks, frt all'd lb.	...	.05¾	...	.05¾	.05¾	.07½
Acetyl chloride, 100 lb cbys lb.	.55	.68	.55	.68	.55	.68
ACIDS						
Abietic, kgs, bbls ...lb.	.08¾	.09	.08¾	.10	.06¾	.10
Acetic, 28%, 400 lb bbls, c-l, wks ...100 lbs.	...	2.23	...	2.23	2.23	2.53
glacial, bbls, c-l, wks 100 lbs.	...	7.62	...	7.62	7.62	8.70
glacial, USP, bbls, c-l, wks ...100 lbs.	...	10.25	...	10.25	10.50	12.43
Acetylsalicylic, USP, 225 lb bbls ...lb.	..	.50	.50	.60	.50	.60
Adipic, kgs, bbls ...lb.	...	.72	...	.72	...	.72
Anthranilic, ref'd, bbls ...lb.	1.15	1.20	1.15	1.20	.85	1.00
tech, bbls ...lb.	...	.75	...	.75	...	.75
Ascorbic, bot. ...oz.	3.00	3.25	...	...	...	...
Battery, cbys, wks ...100 lbs.	1.60	2.55	1.60	2.55	1.35	2.60
Benzoic, tech, 100 lb kgs ..lb.	.43	.47	.43	.47	.43	.47
USP, 100 lb kgs ...lb.	.54	.59	.54	.59	.54	.59
Boric, tech, gran, 80 tons, bgs, delv ...ton *a*	...	96.00	95.00	96.00	...	95.00
Broenner's, bbls ...lb.	...	1.11	...	1.11	...	1.11
Butyric, edible, c-l, wks, cbys lb.	1.20	1.30	1.20	1.30	1.20	1.30
synthetic, c-l, drs, wks ..lb.	...	.22	...	.22	...	.22
wks, lcl ...lb.	...	.23	...	.23	...	.23
tks, wks ...lb.	...	.21	...	.21	...	.21
Camphoric, drs ...lb.	5.50	5.70	5.50	5.70	5.50	5.70
Caproic, normal, drs. ...lb.	...	.35	...	...	...	...
Chicago, bbls ...lb.	...	2.10	...	2.10	...	2.10
Chlorosulfonic, 1500 lb drs, wks ...lb.	.03½	.05	.03½	.05	.03½	.05
Chromic, 99¾%, drs, delv lb.	.15¼	.17¼	.15¼	.17¼	.15¼	.16¼
Citric, USP, crys, 230 lb bbls ...lb. *b*	.22	.23½	.22	.25	.24	.26
anhyd, gran, bbls ...lb. *b*	...	.25½	.25½	.26½	.26½	.29
Cleve's, 250 lb bbls ...lb.	...	.57	.50	.57	.50	.52
Cresylic, 99%, straw, HB, drs, wks, frt equal gal.	.63	.64	.63	.91	.72	.91
99%, straw, LB, drs, wks, frt equal ...gal.	.69	.71	.69	.94	.77	.94
resin grade, drs, wks, frt equal ...lb.	.09	.09½	.09	.11¼	.09	.11¼
Crotonic, bbls, delv ...lb.	.21	.50	.21	1.00	.75	1.00
Formic, tech, 140 lb drs ..lb.	.10½	.11½	.10½	.11½	.10½	.13
Fumaric, bbls ...lb.	...	.75	.60	.75	...	.60
Fuming, see Sulfuric (Oleum)						
Gallic, tech, bbls ...lb.	.70	.73	.70	.79	.65	.75
USP, bbls ...lb.	.77	.81	.77	.91	.77	.91
Gamma, 225 lb bbls, wks ..lb.	...	.85	...	.85	...	.85
H, 225 lb bbls, wks ...lb.	.50	.55	.50	.55	.50	.55
Hydriodic, USP, 47% bottles ...lb.	...	2.30	2.20	2.30	...	...
Hydrobromic, 34% conct 155 lb cbys, wks ...lb.	.42	.44	.42	.44	.40	.42
Hydrochloric, see muriatic						
Hydrocyanic, cyl, wks ...lb.	.80	1.30	.80	1.30	.80	1.30
Hydrofluoric, 30%, 400 lb bbls, wks ...lb.	.07	.07½	.07	.07½	.07	.07½
Hydrofluosilicic, 35%, 400 bbls, wks ...lb.	.09	.09½	.09	.15	.10½	.15
Lactic, 22%, dark, 500 lb bbls lb.	.02½	.02¾	.02½	.02¾	.02½	.02¾
22%, light ref'd, bbls ...lb.	.03½	.03¾	.03½	.03¾	.03½	.03¾
44%, light, 500 lb bbls ..lb.	.05½	.05¾	.05½	.05¾	.05½	.05¾
44%, dark, 500 lb bbls ..lb.	.06½	.06¾	.06½	.06¾	.06½	.06¾
50%, water white, 500 lb bbls ...lb.	.10½	.11½	.10½	.11½	.10½	.11½
USP X, 85%, cbys ...lb.	.42	.45	.42	.45	.42	.50
Lauric, drs. ...lb.	11¾	.12¼	.08½	.12¼	...	...
Laurent's, 250 lb bbls ...lb.	.45	.46	.45	.46	.45	.46
Levulinic, 5 lb bot, wks ...lb.	...	2.00	...	2.00	...	...
Linoleic, bbls ...lb.	...	.20	...	.20	.16	.20
Maleic, powd, kgs ...lb.	.30	.40	.30	.40	.29	.40
Malic, powd, kgs ...lb.	.45	.60	.45	.60	.45	.60
Metanillic, 250 lb bbls ...lb.	.60	.65	.60	.65	.60	.65
Mixed, tks, wks ...N unit	.06½	.07¼	.06½	.07¼	.06½	.07¼
S unit	.008	.009	.008	.009	.008	.009

a Powdered boric acid $5 a ton higher in each case; USP $15 higher; *b* Powdered citric is ½c higher; kegs are in each case ½c higher than bbls.; *y* Price given is per gal.

	Current Market		1938 Low	1938 High	1937 Low	1937 High
Monochloracetic, tech, bbls lb.	.16	.18	.16	.18	.16	.18
Monosulfonic, bbls ...lb.	1.50	1.60	1.50	1.60	1.50	1.60
Muriatic, 18°, 120 lb cbys, c-l, wks ...100 lb.	...	1.50	...	1.50	1.35	1.50
tks, wks ...100 lb.	...	1.00	...	1.00	...	1.00
20°, cbys, c-l, wks ..100 lb.	...	1.75	...	1.75	1.45	1.75
tks, wks ...100 lb.	...	1.10	...	1.10	...	1.10
22°, c-l, cbys, wks ..100 lb.	...	2.25	...	2.25	1.95	2.25
tks, wks ...100 lb.	...	1.60	...	1.60	...	1.60
CP, cbys ...lb.	.06½	.07½	.06½	.07½	.06½	.07½
N & W, 250 lb bbls ...lb.	.85	.87	.85	.87	.85	.87
Naphthenic, 240-280 s.v., drs lb.	.10	.13	.10	.13	.10	.14
Sludges, drs ...lb.	...	.05	...	.05	.05	.10
Naphthionic, tech, 250 lb bbls lb.	.60	.65	.60	.65	.60	.65
Nitric, 36°, 135 lb cbys, c-l, wks ...100 lb. *c*	...	5.00	...	5.00	...	5.00
38°, c-l, cbys, wks ..100 lb. *c*	...	5.50	...	5.50	...	5.50
40°, cbys, c-l, wks ..100 lb. *c*	...	6.00	...	6.00	...	6.00
42°, c-l, cbys, wks ..100 lb. *c*	...	6.50	...	6.50	...	6.50
CP, cbys, delv ...lb.	.11½	.12½	.11½	.12½	.11½	.12½
Oxalic, 300 lb bbls, wks, or N Y ...lb.	.10¾	.12	.10¾	.12	.10¾	.12
Phosphoric, 85%, USP, cbys lb.	.12	.14	.12	.14	.12	.14
50%, acid, c-l, drs, wks ..lb.	.06	.08	.06	.08	.06	.08
75%, acid, c-l, drs, wks ..lb.	...	.07½	.07½	.10½	.09	.10½
Picramic, 300 lb bbls, wks ..lb.	.65	.70	.65	.70	.65	.70
Picric, kgs, wks ...lb.	.35	.40	.35	.40	.35	.40
Propionic, 98% wks, drs ..lb.	...	.22	...	.22	.20	.22
80% ...lb.	.16	.17½	.16	.17½	.16	.17½
Pyrogallic, tech, lump, pwd, bbls ...lb.	...	1.05	...	1.05	...	...
cryst, USP ...lb.	1.45	1.63	1.45	1.63	1.30	1.48
Ricinoleic, bbls ...lb.	...	.35	.35	.38	.35	.38
tech, bbls ...lb.	...	.13	...	.13	...	...
Salicylic, tech, 125 lb bbls, wks ...lb.	...	.33	...	.33	...	.33
USP, bbls ...lb.	.35	.40	.35	.45	...	...
Sebacic, tech, drs, wks ...lb.	...	nom.	.37	.41	.37	.41
Succinic, bbls ...lb.	...	.75	...	.75	...	.75
Sulfanilic, 250 lb bbls, wks lb.	.17	.18	.17	.18	.17	.18
Sulfuric, 60°, tks, wks ...ton	...	13.00	...	13.00	12.00	13.00
c-l, cbys, wks ...100 lb.	...	1.25	...	1.25	1.10	1.25
66°, tks, wks ...ton	...	16.50	...	16.50	15.50	16.50
c-l, cbys, wks ...100 lb.	...	1.50	...	1.50	1.35	1.50
CP, cbys, wks ...lb.	.06½	.07½	.06½	.07½	.06½	.07½
Fuming (Oleum) 20% tks, wks ...ton	...	18.50	...	18.50	...	18.50
Tannic, tech, 300 lb bbls ..lb.	.40	.47	.40	.47	.19	.47
Tartaric, USP, gran, powd, 300 lb bbls ...lb.	.27¼	.27¾	.24¼	.27¾	.21¾	.25¼
Tobias, 250 lb bbls ...lb.	.65	.67	.65	.67	.65	.67
Trichloroacetic bottles ...lb.	2.00	2.50	2.00	2.50	2.00	2.50
kgs ...lb.	...	1.75	...	1.75	...	1.75
Tungstic, tech, bbls ...lb.	1.65	1.75	1.65	2.00	...	...
Vanadic, drs, wks ...lb.	1.10	1.20	1.10	1.20	1.10	1.20
Albumen, light flake, 225 lb bbls ...lb.	.52	.60	.52	.60	.47	.60
dark, bbls ...lb.	.13	.18	.11	.18	.11	.17
egg, edible ...lb.	.77	.78	.77	1.15	.76	1.15
vegetable, edible ...lb.	.74	.78	.74	.78	.76	.78
Alcohol, Amyl (from Pentane) tks, delv ...lb.	...	.106	.106	.123	...	.123
c-l, drs, delv ...lb.	...	.116	.116	.133	...	.133
lcl, drs, delv ...lb.	...	.126	.126	.143	...	.143
Amyl, secondary, tks, delv lb.	...	.08½	...	.08½	...	.08½
drs, c-l, delv E. of Rockies ...lb.	...	.09½	...	.09½	...	...
Benzyl, cans ...lb.	.68	1.00	.68	1.00	.65	1.10
Butyl, normal, tks, f.o.b. wks, frt all'd ...lb. *d*	...	.08½	.08½	.09	.08½	.09
c-l, drs, f.o.b. wks, frt all'd ...lb. *d*	...	.09½	.09½	.10	.09½	.10
Butyl, secondary, tks, delv ...lb. *d*	...	.06	...	.06	.06	.07
c-l, drs, delv ...lb. *d*	...	.07	...	.07	.07	.08
Capryl, drs, tech, wks ..lb.	...	.85	...	.85	...	.85
Cinnamic, bottles ...lb.	2.00	2.50	2.00	2.50	2.00	3.65
Denatured, CD, 14, 13, c-l, drs, wks. ...gal. *e*	...	.32	.31	.35	.33	.35
tks, East, wks ...gal.	...	.24	.23	.29	...	...
Western schedule, c-l, drs, wks ...gal. *e*	...	.37	.36	.38	.37	.39
Denatured, SD, No. 1, tks	...	.22	.22	.27	.26	.27
c-l, drs, wks ...gal. *e*	...	.28	.28	.33	.32	.33

c Yellow grades 25c per 100 lbs. less in each case; *d* Spot prices are 1c higher; *e* Anhydrous is 5c higher in each case; *f* Pure prices are 1c higher in each case.

ABBREVIATIONS—Anhydrous, anhyd; bags, bgs; barrels, bbls; carboys, cbys; carlots, c-l; less-than-carlots, lcl; drums, drs; kegs, kgs; powdered, powd; refined, ref'd; tanks, tks; works, f.o.b., wks.

Prices—Current

		Current Market		1938 Low	1938 High	1937 Low	1937 High
Alcohols (continued):							
Diacetone, pure, c-l, drs, delv	lb. *f*	...	.11½	...	.11½	...	.11½
tech, contract, drs, c-l, delv	lb.	...	.10½	...	.10½	...	...
Ethyl, 190 proof, molasses, tks	gal. *g*	...	4.48½	4.04	4.51½	4.05	4.07
c-l, drs	gal. *g*	...	4.54½	4.10	4.59½	4.11	4.12
c-l, bbls	gal. *g*	...	4.55½	4.11	4.58½	4.12	4.13
absolute, drs., f.o.b. wks.	*g*	4.88	4.95	4.40	4.93	4.54	6.08½
Furfuryl, tech, 500 lb drs	lb.	.25	.35	.25	.35	.30	.35
Hexyl, secondary tks, delv	lb.	...	.12	...	.12	.11½	.12
c-l, drs, delv	lb.	...	.13	...	.13	.12½	.13
Normal, drs, wks	lb.	3.25	3.50	3.25	3.50	3.25	3.50
Isoamyl, prim, cans, wks	lb.	...	.32	...	.32	...	.32
drs, lcl, delv	lb.	...	.27	.	.27	...	.27
Isobutyl, ref'd, lcl, drs	lb.	...	.09	.09	.10	...	.10
c-l, drs	lb.	...	.08½	.08½	.09½	...	.09½
tks	lb.	...	.07½	.07½	.08½	...	.08½
Isopropyl, ref'd, 91%, c-l, drs, f.o.b. wks, frt all'd	lb.	...	.36	...	.36	.39½	.45
Ref'd 98%, drs. f.o.b. wks, frt all'd	gal.	...	.41	...	.41	...	...
Tech 91%, drs, above terms	gal.	...	.33½	...	.33½	...	...
tks, same terms	gal.	...	.28½	...	.28½	...	...
Tech 98%, drs, above terms	gal.	...	.37½	...	.37½	...	...
tks, above terms	gal.	...	.32½	...	.32½	...	...
Spec Solvent, tks, wks	gal.	...	.23	.23	.28	.27	.28
Aldehyde ammonia, 100 gal drs	lb.	.80	.82	.80	.82	.80	.82
Aldehyde Bisulfite, bbls, delv	lb.	...	.17	...	.17	...	...
Aldol, 95%, 55 and 110 gal drs, delv	lb.	...	.20	...	.20	...	...
Alphanaphthol, crude, 300 lb bbls	lb.	...	.52	...	.52	...	.52
Alphanaphthylamine, 350 lb bbls	lb.	.32	.34	.32	.34	.32	.34
Alum, ammonia, lump, c-l, bbls, wks	100 lb.	3.40	3.65	3.40	3.65	3.00	3.25
delv NY, Phila	100 lb.	...	3.40	...	3.40	3.15	3.40
Granular, c-l, bbls. wks	100 lb.	3.15	3.40	3.15	3.40	2.75	3.00
Powd, c-l, bbls, wks	100 lb.	...	3.55	...	3.55	3.15	3.40
Chrome, bbls	100 lb.	6.50	6.75	6.50	6.75	6.50	7.25
Potash, lump, c-l, bbls, wks	100 lb.	3.65	3.90	3.65	3.90	3.25	3.50
Granular, c-l, bbls, wks	100 lb.	3.40	3.65	3.40	3.65	3.00	3.25
Powd, c-l, bbls, wks	100 lb.	3.80	4.05	3.80	4.05	3.40	3.65
Soda, bbls, wks	100 lb.	...	3.25	...	3.25	...	3.25
Aluminum metal, c-l, NY	100 lb.	...	20.00	...	20.00	19.00	20.00
Acetate, 20%, bbls	lb.	.07½	.09	.07½	.10	.09	.10
Basic powd, bbls, delv	lb.	.40	.50	.40	.50	...	...
Chloride anhyd, 99%, wks	lb.	.07	.12	.07	.12	.07	.12
93%, wks	lb.	.05	.08	.05	.08	.05	.08
Crystals, c-l, drs, wks	lb.	.06	.06¼	.06	.06¼	.06	.06¼
Solution, drs, wks	lb.	.02¾	.03¼	.02¾	.03¼	.02¾	.03¼
Formate, 30% sol bbls, c-l, delv	lb.	...	.13	...	.13	...	...
Hydrate, 96%, light, 90 lb bbls, delv	lb.	.12	.13	.12	.13	.13	.15
heavy, bbls, wks	lb.	.029	.03½	.029	.03½	.029	.03½
Oleate, drs	lb.	.16¾	.18½	.16¾	.18½	.16¾	.18½
Palmitate, bbls	lb.	...	.23	...	.23	.22	.23
Resinate, pp., bbls	lb.	...	.15	...	.15	...	.15
Stearate, 100 lb bbls	lb.	.19	.21	.19	.21	.19	.21
Sulfate, com, c-l, bgs, wks	100 lb.	...	1.15	1.15	1.35	...	1.35
c-l, bbls, wks	100 lb.	...	1.35	1.35	1.55	...	1.55
Sulfate, iron-free, c-l, bgs, wks	100 lb.	...	2.00	...	2.00	...	1.90
c-l, bbls, wks	100 lb.	...	2.20	...	2.20	...	2.05
Aminoazobenzene, 110 lb kgs	lb.	...	1.15	...	1.15	...	1.15
Ammonia anhyd fert com, tks	lb.	.04½	.05½	.04½	.05½	.04½	.05½
Ammonia anhyd, 100 lb cyl	lb.	.16	.22	.16	.22	.16	.22
26°, 800 lb drs, delv	lb.	.02¼	.02½	.02¼	.02½	.02¼	.02½
Aqua 26°, tks, NH	cont.	...	.04z	...	.05**	.04½**	.05**
tk wagon	lb.	...	.02	...	.02	...	.02
Ammonium Acetate, kgs	lb.	.26	.33	.26	.33	.26	.33
Bicarbonate, bbls, f.o.b. wks	100 lb.	5.15	5.71	5.15	5.71	5.15	5.71
Bifluoride, 300 lb bbls	lb.	.14½	.16½	.14½	.17	.16	.17
carbonate, tech, 500 lb bbls	lb.	.08	.12	.08	.12	.08	.12
Chloride, White, 100 lb bbls, wks	100 lb.	4.45	4.90	4.45	4.90	4.45	4.90
Gray, 250 lb bbls, wks	100 lb.	5.50	6.25	5.50	6.25	5.00	6.25
Lump, 500 lbs cks spot	lb.	.10½	.11	.10½	.11	.10½	.11
Lactate, 500 lb bbls	lb.	.15	.16	.15	.16	.15	.16
Laurate, bbls	lb.	...	.23	...	.23	...	...
Linoleate, 80% anhyd, bbls	lb.	...	.15	...	.15	.11	.15
Naphthenate, bbls	lb.	...	.17	...	.17	...	...
Nitrate, tech, cks	lb.	.038	.0405	.038	.0405	.03¾	.04
Oleate, drs	lb.	...	.15		.15	.15	.10
Oxalate, neut, cryst, powd, bbls	lb.	.19	.20	.19	.22½	.22½	.23
Perchlorate, kgs	lb.		.16		.16		.16
Persulfate, 112 lb kgs	lb.	.21	.24	.21	.24	.21	.24
Phosphate, dibasic tech, powd, 325 lb bbls	lb.	.07½	.10	.07½	.10	.07½	.10
Ricinoleate, bbls	lb.	...	.15	...	.15	...	...

g Grain alcohol 20c a gal. higher in each case. ** On a delv. basis. *z* On a f.o.b. wks. basis.

		Current Market		1938 Low	1938 High	1937 Low	1937 High
Ammonium (continued).							
Stearate, anhyd, bbls	lb.	...	.24	...	.24	...	...
Paste, bbls	lb.	...	.07½		.07½		
Sulfate, dom, f.o.b., bulk	ton	...	27.75	26.50	28.50	26.00	28.00
Sulfocyanide, pure, kgs	lb.	...	.55	...	.55	...	.55
Amyl Acetate (from pentane) tks, delv	lb.	...	.10	.10	.11½	...	.11½
c-l, drs, delv	lb.	...	.11	...	...	...	...
lcl, drs, delv	lb.	...	.12	...	...	...	...
tech, drs, delv	lb.	...	.10½	.11	.10½	.11½	.13½
Secondary, tks, delv	lb.	...	.08½	...	.08½	...	.08½
c-l, drs, delv	lb.	...	.09½	...	.09½	...	.09½
tks, delv	lb.	...	.08½	...	.08½	...	.08½
Chloride, norm, drs, wks	lb.	.56	.68	.56	.68	.56	.68
mixed, drs, wks	lb.	.07	.077	.07	.077	.07	.077
tks, wks	lb.	...	.06	...	.06	...	.06
Mercaptan, drs, wks	lb.	...	1.10	...	1.10	...	1.10
Oleate, lcl, wks, drs	lb.	...	.25	...	.25	...	.25
Stearate, lcl, wks, drs	lb.	...	.26	...	.26	...	.26
Amylene, drs, wks	lb.	.102	.11	.102	.11	.102	.11
tks, wks	lb.	...	.09	...	.09	...	.09
Aniline Oil, 960 lb drs and tks	lb.	.14½	.17½	.14½	.17½	.15	.17½
Annatto fine	lb.	.34	.37	.34	.37	.34	.37
Anthracene, 80%	lb.	...	.75	...	.75	...	.75
40%	lb.	...	.18	...	.18	...	.18
Anthraquinone, sublimed, 125 lb bbls	lb.	...	.65	...	.65	.50	.65
Antimony metal slabs, ton lots	lb.	...	.11¼	.10¾	.14	.13⅝	.17¼
Butter of, see Chloride.							
Chloride, soln cbys	lb.	...	.17	...	.17	...	.17
Needle, powd, bbls	lb.	.12½	.14	.12½	.16	.14	.19½
Oxide, 500 lb bbls	lb.	.11½	.12½	.11½	.16½	.14¼	.16½
Salt, 63% to 65%, tins	lb.	.26	.27	.26	.27	.22	.24
Sulfuret, golden, bbls	lb.	.22	.23	.22	.23	.22	.23
Archil, conc, 600 lb bbls	lb.	.21	.27	.21	.27	.21	.27
Double, 600 lb bbls	lb.	.18	.20	.18	.20	.18	.20
Aroclors, wks	lb.	.18	.30	.18	.30	.18	.30
Arrowroot, bbl	lb.	.08½	.09	.08½	.09	.08½	.09¾
Arsenic, Metal	lb.	.40	.41	.40	.44	.42	.44
Red, 224 lb cs kgs	lb.	...	.15¾	...	.15¾	...	.15¾
White, 112 lb kgs	lb.	.03	.03¾	.03	.04	.03	.04
Barium Carbonate precip, 200 lb bgs, wks	ton	52.50	62.50	52.50	62.50	52.50	62.50
Nat (witherite) 90% gr, c-l, wks, bgs	ton	41.00	43.00	41.00	44.00	42.00	45.00
Chlorate, 112 lb kgs, NY	lb.	.16½	.17½	.16½	.17½	.16½	.17½
Chloride, 600 lb bbls, delv, zone 1	ton	77.00	92.00	77.00	92.00	74.00	92.00
Dioxide, 88%, 690 lb drs	lb.	.11	.12	.11	.12	.11	.12
Hydrate, 500 lb bbls	lb.	.04¾	.05½	.04¾	.05½	.04¾	.05½
Nitrate, bbls	lb.	.06¾	.07¼	.06¾	.08¼	.07	.08¼
Barytes, floated, 350 lb bbls c-l, wks	ton	...	23.65	...	23.65	...	23.65
Bauxite, bulk, mines	ton	7.00	10.00	7.00	10.00	7.00	10.00
Bentonite, c-l, 325 mesh, bgs, wks	ton	...	16.00	...	16.00	...	16.00
200 mesh	ton	...	11.00	...	11.00	...	11.00
Benzaldehyde, tech, 945 lb drs, wks	lb.	.60	.62	.60	.62	.60	.62
Benzene (Benzol), 90%, Ind, 8000 gal tks, ft all'd	gal.	...	.16	...	.16	...	.16
90% c-l, drs	gal.	...	.21	...	.21	...	.21
Ind pure, tks, frt all'd	gal.	...	.16	...	.16	...	.16
Benzidine Base, dry, 250 lb bbls	lb.	.70	.72	.70	.72	.70	.72
Benzoyl Chloride, 500 lb drs	lb.	.40	.45	.40	.45	.40	.45
Benzyl Chloride, 95-97% rfd, drs	lb.	.30	.40	.30	.40	.30	.40
Tech, drs	lb.	.25	.26	.25	.26	.25	.26
Beta-Naphthol, 250 lb bbl, wks	lb.	.23	.24	.23	.24	.23	.24
Naphthylamine, sublimed, 200 lb bbls	lb.	1.25	1.35	1.25	1.35	1.25	1.35
Tech, 200 lb bbls	lb.	.51	.52	.51	.52	.51	.52
Bismuth metal	lb.	1.05	1.15	1.00	1.10	1.00	1.10
Chloride, boxes	lb.	3.20	3.25	3.20	3.25	3.20	3.25
Hydroxide, boxes	lb.	3.15	3.20	3.15	3.20	3.15	3.20
Oxychloride, boxes	lb.	...	2.95	...	2.95	2.75	3.04
Subbenzoate, boxes	lb.	3.25	3.30	3.25	3.30	3.25	3.30
Subcarbonate, kgs	lb.	1.53	1.56	1.13	1.58	1.23	1.58
Trioxide, powd, boxes	lb.	...	3.57	...	3.57	3.45	3.57
Subnitrate, fibre, drs	lb.	1.33	1.36	1.03	1.48	1.22	1.48
Blanc Fixe, 400 lb bbls, wks	ton *h*	40.00	75.00	40.00	75.00	40.00	75.00
Bleaching Powder, 800 lb drs, c-l, wks, contract	100 lb.	...	2.00	...	2.00	...	2.00
lcl, drs, wks	lb.	2.25	3.60	2.25	3.60	2.25	3.60
Blood, dried, f.o.b., NY	unit	...	3.25	2.50	3.25	3.10	4.30
Chicago, high grade	unit	...	3.35	2.35	3.35	3.00	4.65
Imported shipt	unit	...	3.00	2.90	3.45	3.25	4.10
Blues, Bronze Chinese Milori Prussian Soluble	lb.	.36	.37	.36	.37	.36	.37
Ultramarine,* dry, wks, bbls	lb.	...	.11	...	.11	.10	.11
Regular grade, group 1	lb.	...	.16	...	.16	.15	.16
Special, group 1	lb.	...	.19	...	.19	.18	.19
Pulp, No. 1	lb.	...	.27	...	.27	.26	.27
Bone, 4½ + 50% raw, Chicago	ton	28.00	29.00	25.50	30.00	26.00	30.00
Bone Ash, 100 lb kgs	lb.	.06	.07	.06	.07	.06	.07
Black, 200 lb bbls	lb.	.06½	.08¼	.06½	.08¼	.05½	.08¼
Meal, 3% & 50%, imp.	ton	...	22.50	20.50	23.75	23.75	27.75
Domestic, bgs, Chicago	ton	24.00	26.00	16.00	26.00	19.00	27.00
Borax, tech, gran, 80 ton lots, sacks, delv	ton *i*	...	43.00	42.00	43.00	40.00	42.00
bbls, delv	ton *i*	...	53.00	52.00	53.00	50.00	52.00

h Lowest price is for pulp, highest for high grade precipitated; i Crystals $6 per ton higher; USP, $15 higher in each case; * Freight is equalized in each case with nearest producing point.

Prices—Current

Borax
Chrome Yellow

	Current Market		1938 Low	1938 High	1937 Low	1937 High
Borax (continued):						
Tech, powd, 80 ton lots, sacks . . . . . . ton *i*	...	47.00	...	47.00	45.00	47.00
bbls, delv . . . . . . ton *i*	...	57.00	...	57.00	56.00	57.00
Bordeaux Mixture, drs . . . lb.	.11	.11½	.11	.11½	.10½	.11
Bromine, cases . . . . . . lb.	.30	.43	.30	.43	.30	.43
Bronze, Al, pwd, 300 lb drs lb.	.90½	.92½	.90½	.92½	.80	1.50
Gold, blk . . . . . . lb.	.45	.65	.45	.65	.40	.65
Butanes, com 16-32° group 3 tks . . . . . . lb.	.02¼	.03¾	.02¼	.03¾	.02¼	.03¾
Butyl, Acetate, norm drs, frt allowed . . . . . . lb.	.09½	.10	.09½	.10½	.10	.10½
tks, frt allowed . . . . . . lb.	...	.08½	.08½	.09	...	.09
Secondary, tks, frt allowed . . . . . . lb.		.06½	.06½	.07	.07	.07½
drs, frt, allowed . . . . . lb.	.07½	.08	.07½	.08½	.08	.09
Aldehyde, 50 gal drs, wks . . . . . . lb.	.16½	.17½	.16½	.17½	.16½	.17½
Carbinol, norm drs, wks lb.	.60	.75	.60	.75	.60	.75
Crotonate, norm, 55 and 110 gal drs, delv . . . . lb.	...	.36	...	.36	...	...
Lactate . . . . . . lb.	.22½	.23½	.22½	.23½	.22½	.23½
Oleate, drs, frt allowed . . lb.		.25	...	.25	...	.25
Propionate, drs . . . . . . lb.	.18	.18½	.18	.18½	.18	.18½
tks, delv . . . . . . lb.	..	.17	...	.17	...	.17
Stearate, 50 gal drs . . . . lb.	..	.26	...	.26	.25	.26
Tartrate, drs . . . . . . lb.	.55	.60	.55	.60	.55	.60
Butyraldehyde, drs, lcl, wks lb.	...	.35½	...	.35½	...	.35½
Cadmium Metal . . . . . . lb.	.	.85	.85	1.60	1.05	1.60
Sulfide, orange, boxes . . . lb.	.80	.90	.80	1.60	.90	1.60
Calcium, Acetate, 150 lb bgs c-l, delv . . . . . 100 lb.	...	1.65	...	1.65	1.65	2.25
Arsenate, c-l, E. of Rockies, dealers, drs . . . . . . lb.	.06¾	.07¼	.06¾	.07¼	.06¼	.07¾
Carbide, drs . . . . . . lb.	.05	.06	.05	.06	.05	.06
Carbonate, tech, 100 lb bgs c-l . . . . . . lb.	...	1.00	...	1.00	...	1.00
Chloride, flake, 375 lb drs, burlap bgs, c-l, delv . . ton		22.00	22.00	23.50	22.00	23.50
paper bgs, c-l, delv . . . ton	23.00	36.00	23.00	36.00	...	...
Solid, 650 lb drs, c-l, delv . . . . . . ton	...	20.00	20.00	21.50	20.00	21.50
Ferrocyanide, 350 lb bbls wks . . . . . . lb.	...	.17	...	.17	...	.17
Gluconate, Pharm, 125 lb bbls . . . . . . lb.	.50	.57	.50	.57	.50	.57
Levulinate, less than 25 bbl lots, wks . . . . . . lb.	...	3.00	...	3.00	...	...
Nitrate, 100 lb bgs . . . . . ton	..	28.00	...	28.00	26.10	28.00
Palmitate, bbls . . . . . . lb.	.22	.23	.22	.23	.22	.23
Phosphate, tribasic, tech, 450 lb bbls . . . . . . lb.	.06½	.07½	.06½	.07½	.06½	.07½
Resinate, precip, bbls . . . lb.	.13	.14	.13	.14	.13	.14
Stearate, 100 lb bbls . . . lb.	.19	.21	.19	.21	.19	.21
Camphor, slabs . . . . . . lb.	.52	.52½	.52	.56	.54	.56
Powder . . . . . . lb.	.52	.52½	.52	.56	.54	.56
Carbon Bisulfide, 500 lb drs lb.	.05	.05¾	.05	.05¾	.05	.05¾
Black, c-l, bgs, delv, price varying with zone† . . . lb.	.02¾	.03¾	.027	.0380	.0320	.0535
lcl, bgs, f.o.b. whse . . lb.	...	.06¼	.05¾	.06¼	.06½	.07
cartons, f.o.b. whse . . lb.	...	.06¼	...	.06¼	.07	.07¾
cases, f.o.b. whse . . . lb.	...	.07	...	.07	.07¾	.08¼
Decolorizing, drs, c-l . . . lb.	.08	.15	.08	.15	.08	.15
Dioxide, Liq 20-25 lb cyl lb.	.06	.08	.06	.08	.06	.08
Tetrachloride, 55 or 110 gal drs, c-l, delv . . . . . . lb.	.05	.05½	.05	.06	.05¼	.06
Casein, Standard, Dom, grd lb.	.08½	.11	.06½	.13½	.11	.20¾
80-100 mesh, c-l, bgs . . . . lb.	.09	.11½	.07	.14	.11½	.21¼
Castor Pomace, 5½ NH_3, c-l, bgs, wks . . . . . . ton	..	18.50	18.50	21.00	21.00	25.00
Imported, ship, bgs . . . . ton		20.00	20.00	21.00	nom	17.00
Celluloid, Scraps, ivory cs lb.	.12	.15	.12	.15	.12	.15
Transparent, cs . . . . . . lb.	..	.20	.	.20	..	.20
Cellulose, Acetate, 50 lb kgs . . . . . . lb.	.	.36	.36	.40	.40	.55
Chalk, dropped, 175 lb bbls lb.	.02¾	.03¾	.02¾	.03¾	.03	.03¾
Precip, heavy, 560 lb cks lb.	.02¾	.03¼	.02¼	.04	.03	.04
Light, 250 lb cks . . . . . . lb.	.03¼	.04	.03¼	.04	.03	.04
Charcoal, Hardwood, lump, blk, wks . . . . . . bu.	..	.15	...	.15	...	.15
Softwood, bgs, delv* . . . ton	23.00	34.00	23.00	34.00	23.00	34.40
Willow, powd, 100 lb bbl. wks . . . . . . lb.	.06	.07	.06	.07	.06	.07
Chestnut, clarified, tks, wks lb.	...	.01⅝	.01⅝	.02125	.01625	.02125
25%, bbls, wks . . . . . . lb.	...	.02	.02	.0225	.02	.0225
Pwd, 60%, 100 lb bgs, wks . . . . . . lb.	...	.04½	.04½	.04⅞	...	.04⅞
China Clay, c-l, blk mines ton		7.00		7.00	6.50	7.00
Imported, lump, blk . . . ton	22.00	25.00	22.00	25.00	22.00	25.00
Chlorine, cyls, lcl, wks, contract . . . . . . lb.	.07½	.08½	.07½	.08½	.07½	.08½
cyls, c-l, contract . . . lb. *j*	...	.05½		.05½	...	.05½
Liq, tk, wks, contract 100 lb.	..	2.00	2.00	2.15	...	2.15
Multi, c-l, cyls, wks, cont . . . . . . lb.	2.30	2.55	2.30	2.55	2.30	2.55
Chloroacetophenone, tins, wks . . . . . . lb.	3.00	3.50	3.00	3.50	3.00	3.50
Chlorobenzene, Mono, 100 lb drs, lcl, wks . . . . . . lb.	.06	.07½	.06	.07½	.06	.07½
Chloroform, tech, 1000 lb drs . . . . . . lb.	.20	.21	.20	.21	.20	.21
USP, 25 lb tins . . . . . . lb.	.30	.31	.30	.31	.30	.31
Chloropicrin; comml cyls . . lb.	...	.80	...	.80	...	.80
Chrome, Green, CP . . . . . . lb.	.21	.25	.21	.25	.20	.25
Yellow . . . . . . lb.	.14½	.15½	.14½	.15½	.13	.16½

j A delivered price; * Depends upon point of delivery.

	Current Market		1938 Low	1938 High	1937 Low	1937 High
Chromium, Acetate, 8%						
Chrome, bbls .... lb.	.05	.08	.05	.08	.05	.08
Fluoride, powd, 400 lb bbl .... lb.	.27	.28	.27	.28	.27	.28
Coal tar, bbls .... bbl.	7.50	8.00	7.50	8.00	6.75	9.00
Cobalt Acetate, bbls ...... lb.	.65	.67	.65	.68	.58	.68
Carbonate tech, bbls .... lb.	...	1.63	.	1.63	1.42¾	1.63
Hydrate, bbls .... lb.	...	1.78	1.36	1.78	...	...
Linoleate, solid, bbls ... lb.	...	.33	...	.33	.31	.33
paste, 6%, drs .... lb.	...	.31	...	.31	...	.31
Oxide, black, bgs .... lb.	...	1.67	...	1.67	1.41	1.67
Resinate, fused, bbls .... lb.	...	.13½	...	.13½	.13	.13½
Precipitated, bbls .... lb.	...	.34	...	.34	.30½	.34
Cochineal, gray or bk bgs . . lb.	.35	.38	.35	.38	.32	.38
Teneriffe silver, bgs .... lb.	.36	.39	.36	.39	.33	.39
Copper, metal, electrol 100 lb.	...	11.25	9.00	11.25	11.00	16.25
Acetate, normal, bbls, wks .... lb.	.21	.23	.21	.23		...
Carbonate, 400 lb bbls . . lb.	.10½	.11½	.10¼	.11½	.10½	.12½
52-54% bbls .. lb.	.14½	.15½	.1340	.16¾	.15¾	.19
Chloride, 250 lb bbls ... lb.	.13	.14	.12½	.17	.15	.18
Cyanide, 100 lb drs ..... lb.	...	.34	.34	.38	.37	.38
Oleate, precip, bbls ..... lb.	...	.20	.	.20	. .	.20
Oxide, black, bbls, wks . . lb.	.16¾	.17¾	.13½	.17¾	.17	.18
red 100 lb bbls ...... lb.	.16¾	.17¾	.15	.19775	.17	.19975
Resinate, precip, bbls ... lb.	.15	.16	.15	.16	.15	.19
Stearate, precip, bbls lb.	.23	.24	.23	.24	.23	.40
Sub-acetate verdigris, 400 lb bbls .... lb.	.18	.19	.18	.19	.18	.19
Sulfate, bbls, c-l, wks 100 lb.	. .	4.50	4.00	4.50	4.25	4.50
Copperas, crys and sugar bulk c-l, wks ...... ton		14.00	12.00	14.00	12.00	13.00
Corn Sugar, tanners, bbls 100 lb.	3.05	3.15	2.95	3.30	3.15	4.34
Corn Syrup, 42°, bbls 100 lb.	...	3.12	2.89	3.16	3.11	4.36
43°, bbls ...... 100 lb.	...	3.17	2.94	3.21	3.16	4.41
Cotton, Soluble, wet, 100 lb bbls .... lb.	.40	.42	.40	.42	.40	.42
Cream Tartar, powd & gran, 300 lb bbls .... lb.	.22¾	.23¼	.19¾	.23¼	.15	.20¼
Creosote, USP, 42 lb cbys lb.	.45	.47	.45	.47	.45	.47
Oil, Grade 1, tks ...... gal.	.13½	.14	.13½	.14	.13	.14
Grade 2 .... gal.	.122	.132	.122	.132	.113	.132
Cresol, USP, drs .... lb.	.10	.10½	.10	.12½	.10	.13
Crotonaldehyde, 97%, 55 and 110 gal drs, delv .... lb.	...	.22	.22	.30	.26	.30
Cutch, Philippine, 100 lb bale lb.	.04¼	.04½	.04	.06	.04	.04¼
Cyanamid, bgs, c-l, frt allowed Ammonia .... unit	...	1.15	...	1.15	1.10	1.15
Derris root 5% rotenone, bbls .... lb.	.34	.38	.34	.43	.39	.47
Dextrin, corn, 140 lb bgs						
f.o.b., Chicago .... 100 lb.	3.40	3.60	3.30	3.75	3.50	5.00
British Gum, bgs ... 100 lb.	3.65	3.85	3.55	4.00	3.75	5.25
Potato, Yellow, 220 lb bgs lb.	.07¼	.08¾	.07¼	.08¾	.07¾	.08¾
White, 220 lb bgs, lcl lb.	.08	.09	.08	.09	.08	.09
Tapioca, 200 bgs, lcl .... lb.		.0715	.0715	.08		.08
White, 140 lb bgs .. 100 lb.	3.35	3.55	3.30	3.70	4.00	4.58
Diamylamine, c-l, drs, wks lb.	.47	.75	.47	.75	.47	.75
Diamylene, drs, wks ...... lb.	.095	.102	.095	.102	.095	.102
tks, wks .... lb.	...	.08½	...	.08½	...	.08½
Diamylether, wks, drs .... lb.	.085	.092	.085	.092	.085	.092
tks, wks .... lb.	...	.075	...	.075	...	.075
Oxalate, lcl, drs, wks ... lb.	. .	.30	.	.30	.	.30
Diamylphthalate, drs, wks lb.	.19	.19½	.19	.21	.19	.21½
Diamyl Sulfide, drs, wks lb.	.	1.10	...	1.10	.	1.10
Diatomaceous Earth, see Kieselguhr.						
Dibutoxy Ethyl Phthalate, drs, wks .... lb.	...	.35	...	.35	...	.35
Dibutylamine, lcl, drs, wks lb.	...	.55	.	.55	...	...
Dibutyl Ether, drs, wks, lcl lb.	...	.25	.25	.30	...	.30
Dibutylphthalate, drs, wks, frt all'd .... lb.	.19	.19½	.19	.21	.19½	.21
Dibutyltartrate, 50 gal drs lb.	.45	.54	.45	.54	.35	.50
Dichlorethylene, drs ..... lb.	...	.25	...	.25	.25	.29
Dichloroethylether, 50 gal drs, wks .... lb.	.15	.16	.15	.16	.15	.16
tks, wks .... lb.	...	.14	...	.14	...	.14
Dichloromethane, drs, wks lb.	...	.23	...	.23	...	.23
Dichloropentanes, drs, wks lb.	no prices		...	...	...	...
tks, wks .... lb.	no prices		...	...	...	...
Diethanolamine, tks, wks . . lb.		.23	...	.23	.23	.25
Diethylamine, 400 lb drs . . lb.	2.75	3.00	2.75	3.00	2.75	3.00
Diethylaniline, 850 lb drs . . lb.	.40	.52	.40	.50	.40	.50
Diethyl Carbinol, drs ..... lb.	.60	.75	.60	.75	.60	.75
Diethylcarbonate, com drs . . lb.	.31¼	.35	.31¾	.35	.31¼	.35
Diethylorthotoluidin, drs . . lb.	.64	.67	.64	.67	.64	.67
Diethylphthalate, 1000 lb drs lb.	.19	.19½	.19	.19½	.18	.19½
Diethylsulfate, tech, drs, wks, lcl .... lb.	.13	.14	.13	.14	.13	.20
Diethyleneglycol, drs ..... lb.	.16	.17	.16	.17	.16	.23
Mono ethyl ethers, drs . . lb.	.15	.16	.15	.16	.15	.17
tks, wks .... lb.	...	.14	...	.14	.14	.15
Mono butyl ether, drs . . lb.	.23	.24	.23	.24	.23	.26
tks, wks .... lb.	...	.22	...	.22	...	...
Diethylene oxide, 50 gal drs, wks .... lb.	.20	.24	.20	.24	.20	.24
Diglycol Oleate, bbls ..... lb.	...	.21	...	.21	.21	.24
Laurate, bbls .... lb.	...	.27½	...	.27½	...	...
Stearate, bbls .... lb.	...	.27½	...	.27½	...	...
Dimethylamine, 400 lb drs, pure 25 & 40% sol 100% basis .... lb.	...	1.00	.	1.00		.95
Dimethylaniline, 340 lb drs lb.	.23	.24	.23	.27	.26	.27
Dimethyl Ethyl Carbinol, drs lb.	.60	.75	.60	.75	.60	.75
Dimethyl phthalate, drs, wks, frt allowed .... lb.	...	.19	...	.19	.20½	.21
Dimethylsulfate, 100 lb drs lb.	.45	.50	.45	.50	.45	.50
Dinitrobenzene, 400 lb bbls lb. *k*	.16	.19	.16	.19	.16	.19

k Higher price is for purified **material.**

		Current Market		1938		1937	
				Low	High	Low	High
Dinitrochlorobenzene, 400 lb bbls	lb.	.13½	.14	.13½	.14	.14	.17½
Dinitronaphthalene, 350 lb bbls	lb.	.35	.38	.35	.38	.35	.38
Dinitrophenol, 350 lb bbls	lb.	.23	.24	.23	.24	.23	.24
Dinitrotoluene, 300 lb bbls	lb.		.15½	...	.15½	.14½	.15½
Diphenyl, bbls	lb.	.15	.25	.15	.25	.15	.25
Diphenylamine	lb.	.31	.32	.31	.32	.31	.32
Diphenylguanidine, **100 lb drs**	lb.	.35	.37	.35	.37	.35	.37
Dip **Oil, see Tar Acid Oil.**							
Divi **Divi pods, bgs shipmt**	ton	.	nom.	...	nom.	34.00	nom.
Extract	lb.	.05¾	.06¾	.05	.06¾	.05	.05½
EGG YOLK							
Egg Yolk, dom., 200 lb cases	lb.	.67	.69	.60	.69	.68	nom.
Imported	lb.	...	nom.	.62	.68	.53	.65
Epsom Salt, **tech, 300 lb bbls** c-l, NY	100 lb.	1.90	2.10	1.90	2.10	1.80	2.10
USP, c-l, bbls	100 lb.	...	2.10	...	2.10	2.00	2.10
Ether, USP **anaesthesia 55 lb** drs	lb.	.22	.23	.22	.23	.22	.23
(Conc)	lb.	.09	.10	.09	.10	.09	.10
Isopropyl 50 gal drs	lb.	.07	.08	.07	.08	.07	.08
tks, frt allowed	lb.	...	.06	...	.06	...	.06
Nitrous, conc, bottles	lb.	...	.68	...	.68	.68	.77
Synthetic, wks, drs	lb.	.08	.09	.08	.09	.08	.09
Ethyl Acetate, **85% Ester** tks, frt all'd	lb.	...	.051	.051	.05½	.05½	.06½
drs, frt all'd	lb.	.	.061	.061	.06½	.06½	.07½
99%, tks, frt allowed	lb.	...	.0585	.0585	.06¾		.06¾
drs, frt all'd	lb.	...	.0685	.0685	.07¾	...	.07¾
Acetoacetate, 110 gal drs	lb.	.	.27½	.	.27½	...	.27½
Benzylaniline, 300 lb drs	lb.	.86	.88	.86	.88	.86	.88
Bromide, tech, drs	lb.	.50	.55	.50	.55	.50	.55
Cellulose, drs, wks, frt all'd	lb.	.45	.50	.45	1.00	..	...
Chloride, 200 lb drs	lb.	.22	.24	.22	.24	.22	.24
Chlorocarbonate, cbys	lb.	...	.30	...	.30	...	.30
Crotonate, drs	lb.	1.00	1.25	1.00	1.25	1.00	1.25
Formate, drs, frt all'd	lb.	.27	.28	.27	.28	.27	.31
Lactate, drs, wks	lb.	.	.33	...	.33	.	.33
Oxalate, drs, wks	lb.	.30	.34	.30	.34	.30	.34
Oxybutyrate, 50 gal drs, wks	lb.	.30	.30½	.30	.30½	.30	.30½
Silicate, drs, wks	lb.	...	.77	...	.77	...	.77
Ethylene Dibromide, 60 lb drs	lb.	.65	.70	.65	.70	.65	.70
Chlorhydrin, 40%, 10 gal cbys chloro, cont	lb.	.75	.85	.75	.85	.75	.85
Anhydrous	lb.	...	.75	...	.75	...	.75
Dichloride, 50 gal drs, wks	lb.	.0545	.0994	.0545	.0994	.0545	.0994
Glycol, 50 gal drs, wks	lb.	.17	.21	.17	.21	.17	.21
tks, wks	lb.	...	.16	...	.16	...	.16
Mono Butyl Ether, drs, wks	lb.	.20	.21	.20	.21	.20	.21
tks, wks	lb.	...	.19	...	.19	...	.19
Mono Ethyl Ether, drs, wks	lb.	.16	.17	.16	.17	.16	.17
tks, wks	lb.	...	.15	...	.15	...	.15
Mono Ethyl Ether Acetate, drs, wks	lb.	...	.14	...	.14	...	.14
tks, wks	lb.	...	.13	...	.13	...	13
Mono, Methyl Ether, drs wks	lb.	.18	.22	.18	.22	.1?	.22
tks, wks	lb.	...	.17	...	.17	.	.17
Oxide, cyl	lb.	.50	.55	.50	.55	.50	.55
Ethylidenaniline	lb.	.45	.47½	.45	.47½	.45	.47½
Feldspar, blk pottery	ton	17.00	19.00	17.00	19.00	.	14.50
Powd, blk, wks	ton	14.00	14.50	14.00	14.50	14.00	14.50
Ferric Chloride, tech, crys, 475 lb bbls	lb.	.05	.07½	.05	.07½	.05	.07½
sol, 42° cbys	lb.	.06¼	.06½	.06¼	.06½	.06¼	.06½
Fish Scrap, dried, unground, wks	unit *l*	...	no prices	2.75	3.30	...	...
Acid, Bulk, 6 & 3%, delv Norfolk & Baltimore basis	unit *m*	...	2.50	2.50	2.50	2.75	3.15
Fluorspar, 98%, bgs	lb.	. .	33.00		33.00	no prices	
Formaldehyde, USP, 400 lb bbls, wks	lb.	.05¾	.06¼	.05¾	.06¼	.05¾	.06¼
Fossil Flour	lb.	.02½	.04	.02½	.04	.02¼	.04
Fullers Earth, blk, mines	ton	10.00	11.00	10.00	11.00	6.50	15.00
Imp powd, c-l, bgs	ton	23.00	30.00	23.00	30.00	23.00	30.00
Furfural (tech) drs, wks	lb.	.10	.15	.10	.15	.10	.15
Furfuramide (tech) 100 lb drs	lb.	.	.30	...	.30	...	.30
Fusel Oil, 10% impurities	lb.	.12½	.14	.12½	.14	.12½	.18
Fustic, crystals, 100 lb boxes	lb.	.22	.26	.22	.26	.20	.26
Liquid 50°, 600 lb bbls	lb.	.09½	.13	.09½	.13	.08½	.13
Solid, 50 lb boxes	lb.	.17½	.19½	.17½	.19½	.16	.19½
G SALT PASTE							
G Salt paste, 360 lb bbls	lb.	.45	.47	.45	.47	.45	.47
Gall Extract	lb.	.19	.20	.19	.20	.19	.20
Gambier, com 200 lb bgs	lb.	.06¾	.07¾	.06¾	.07¾	...	nom.
Singapore cubes, 150 lb bgs	100 lb.	.08½	.09	.08½	.11	.09½	.10½
Gelatin, tech, 100 lb cs	lb.	.45	.50	.45	.50	.45	.55
Glauber's Salt, tech, c-l, bgs, wks*	100 lb.	.95	1.15	.95	1.15	.95	1.15
Anhydrous, see Sodium Sulfate.							

l + 10; *m* + 50; ***Bbls. are 20c higher.**

		Current Market		1938 Low	1938 High	1937 Low	1937 High
Glue, bone, com grades, c-l							
bgs	lb.	.13	.15½	.13	.16½	.11	.17½
Better grades, c-l, bgs	lb.	.14½	.16½	.14½	.16½	.12½	.17½
Glycerin, CP, 550 lb drs	lb.	...	.12½	.12½	.16	.15½	.29
Dynamite, 100 lb drs	lb.	...	nom.	.12¾	.16	.15½	.29
Saponification, drs	lb.	.08½	.08¾	.08½	.11¼	.11	.29
Soap Lye, drs	lb.	.07½	.07¾	.07½	.10¼	.10	.27
Glyceryl Bori-Borate, bbls	lb.	...	.40	...	.40	...	...
Monoricinoleate, bbls	lb.	...	.27	...	.27	...	...
Monostearate, bbls	lb.	...	.30	...	.30	...	...
Oleate, bbls	lb.	...	.22	...	.22	...	...
Phthalate	lb.	...	.37	...	.37	.29	.37
Glyceryl Stearate, bbls	lb.	...	.18	...	.18	...	.18
Glycol Bori-Borate, bbls	lb.	...	.26	...	.26	...	...
Phthalate, drs	lb.	...	.40	...	.40	.29	.40
Stearate, drs	lb.	...	.27½	...	.27½	.23	.27½

GUMS

		Current Market		1938 Low	1938 High	1937 Low	1937 High
Gum Aloes, Barbadoes	lb.	.85	.90	.85	.90	.85	.90
Arabic, amber sorts	lb.	.09	.09¼	.09	.12	.10½	.15½
White sorts, No. 1, bgs	lb.	.23	.24	.23	.28	.24	.30
No. 2, bgs	lb.	.21	.22	.21	.26	.22	.28
Powd, bbls	lb.	.12½	.14	.12	.16	.14	.19
Asphaltum, Barbadoes (Manjak) 200 lb bgs, f.o.b.,							
NY	lb.	02½	.10½	.02½	.10½	.02½	.10½
California, f.o.b., NY, drs	ton	29.00	55.00	29.00	55.00	29.00	55.00
Egyptian, 200 lb cases,							
f.o.b., NY	lb.	.12	.15	.12	.15	.12	.15
Benzoin Sumatra, USP, 120							
lb cases	lb.	.20	.21	.15	.25	.15	.25
Copal, Congo, 112 lb bgs,							
clean, opaque	lb.	...	.18¾	.18¾	.19¼	.18⅞	.19¼
Dark amber	lb.	...	.07⅛	.07⅛	.08⅞	.06⅞	.09¼
Light amber	lb.	...	.11¼	.11¼	.13¼	.10¼	.14⅜
Copal, East India, 180 lb bgs							
Macassar pale bold	lb.	...	.11⅜	.11⅜	.13	...	.13
Chips	lb.	...	.05⅜	...	.05⅜	.05⅜	.06½
Dust	lb.	.03¼	.04	.03½	.04⅛	.03⅝	.04⅛
Nubs	lb.	...	.09½	.09⅛	.10⅜	.10⅜	.11¼
Singapore, Bold	lb.	...	.14½	.14½	.15¼	.15¼	.15⅝
Chips	lb.	...	.06½	.04¾	.05⅜	.04¼	.05
Dust	lb.	.03¼	.04	.03¼	.04⅛	.03⅝	.04⅛
Nubs	lb.	...	.10	.10	.10⅜	.10	.10¾
Copal Manilla, 180-190 lb							
baskets, Loba A	lb.	...	.10½	.10½	.12	.09¾	.12
Loba B	lb.	...	.10¼	.10¼	.11⅝	.09¼	.11⅝
Loba C	lb.	...	.09¾	.09¾	.11¼	.08⅞	.11¼
DBB	lb.	...	.07⅞	.07⅞	.08¾	.08	.08¾
Dust	lb.	...	.05⅛	.05⅛	.06⅝	.05¾	.06⅝
MA sorts	lb.	...	.05⅞	.05⅞	.07¼	.06¾	.07¼
Copal Pontianak, 224 lb cases,							
bold genuine	lb.	...	.15¼	.15¼	.16½	.15½	.16½
Chips	lb.	...	.08¼	.08¼	.10¼	.09⅛	.11⅛
Mixed	lb.	...	.14	.	.14	.13½	.14
Nubs	lb.	...	.11⅜	.11⅜	.12⅞	.12¾	.13½
Split	lb.	...	.13½	.13½	.13⅞	.13½	.15¼
Dammar Batavia, 136 lb cases							
A	lb.	...	.20	.20	.25½	.23½	.25½
B	lb.	...	.18½	.18½	.24	.22⅛	.24
C	lb.	...	.14⅞	.14⅞	.20⅜	.18½	.20⅜
D	lb.	...	.13⅛	.13⅛	.17½	.15¼	.17½
A/D	lb.	...	.14½	.14½	.20⅜	.17⅝	.20⅜
A/E	lb.	...	.12¼	.12¼	.17¼	.14⅞	.17¼
E	lb.	...	.07⅜	.07⅜	.08½	.07½	.08½
F	lb.	...	.07¼	.	.07¼	.06¼	.07¼
Singapore, No. 1	lb.	...	.15¼	.15¼	.21⅛	.17⅛	.21½
No. 2	lb.	...	.11¼	.10⅜	.15⅜	.14⅛	.16¼
No. 3	lb.	...	.05¼	.05	.05¾	...	.05¾
Chips	lb.	...	.09¼	.09¼	.13½	.10¼	.13½
Dust	lb.	...	.05¼	.05	.05¾	.05¾	.06
Seeds	lb.	...	.07⅜	.07⅜	.09½	.07⅛	.09½
Elemi, cns., c.l.	lb.	...	.08⅛	.08⅛	.09½	.09⅜	.10¼
Ester	lb.	.06¼	.07	.06¼	.08½	.09	.12
Gamboge, pipe, cases	lb.	.60	.65	.60	.80	.58	.80
Powd, bbls	lb.	.65	.70	.65	.85	.65	.85
Ghatti, sol. bgs	lb.	.11	.15	.11	.15	.11	.15
Karaya, bbls., bxs., drs.,	lb.	.14½	.23	...	...	...	...
Kauri, NY,							
Brown XXX, cases	lb.	.60	.60½	.60	.60½	.60	.60½
BX	lb.	...	.38	...	.38	.33	.38
B1	lb.	...	.28	...	.28	.21	.28
B2	lb.	...	.24	...	.24	.15½	.26
B3	lb.	...	.18½	...	.18½	.12	.18½
Pale XXX	lb.	...	.61	...	.61	.61	.65½
No. 1	lb.	...	.41	...	.41	.40	.41
No. 2	lb.	...	.24	...	.24	.22	.24
No. 3	lb.	...	.17¾	...	.17¾	.15	.17¾
Kino, tins	lb.	2.50	2.75	2.00	2.75	.70	2.10
Mastic	lb.	.55	.56	.55	.56	.55	.58
Sandarac, prime quality, 200							
lb bgs & 300 lb cks	lb.	.19	.20	.19	.26	.25	.35
Senegal, picked bags	lb.	.25	.27	.23	.27	.20	.29
Sorts	lb.	.09¼	.09½	.09¼	.12	.09¾	.15
Thus, bbls	280 lbs.	14.00	14.25	13.50	14.25	12.00	14.00
Strained	280 lbs.	14.00	14.25	.	14.25	12.00	14.00
Tragacanth, No. 1, cases	lb.	2.40	2.45	2.40	3.00	2.40	3.25
No. 2	lb.	2.30	2.35	2.30	2.75	2.00	2.75
No. 3	lb.	1.90	1.95	1.90	2.70	1.95	2.70
Yacca, bgs	lb.	.03½	.04½	.03½	.04½	.03¼	.04½
Helium, cyl (200 cu. ft.)	cyl.	. .	25.00	...	25.00	...	25.00
Hematine crystals, 400 lb bbls	lb.	.18	.34	.18	.34	.16	.34
Hemlock, 25%, 600 lb bbls,							
wks	lb.	.03	.03¼	.03	.03¼	.03	.03¼
tks	lb.	...	.02⅝	.02⅝	.02¾	...	.02¾

Current

**Hexalene
Manganese Sulfate**

	Current Market	1938 Low	1938 High	1937 Low	1937 High
Hexalene, 50 gal drs, wks lb.	...	.30	...	.30	...	.30
Hexane, normal 60-70° C.					
Group 3, tks ....gal.	...	.10½	...	.10½	...	.10½
Hexamethylenetetramine,					
powd, drs ....lb.	.35	.36	.35	.36	.35	.36
Hexyl Acetate, secondary,					
delv, drs ....lb.	.13	.13½	.13	.13½	.13	.13½
tks ....lb.	...	.12	...	.12	...	.12
Hoof Meal, f.o.b. Chicago unit	...	2.50	2.35	3.35	3.20	3.75
Hydrogen Peroxide, 100 vol,					
140 lb cbys ....lb.	.19½	.20	.19½	.20	.20	.21
Hydroxylamine Hydrochloride					
.....................lb.	...	3.15	...	3.15	...	3.15
Hypernic, 51°, 600 lb bbls lb.	.16	.21	.16	.21	.15	.21

INDIGO

	Current Market	1938 Low	1938 High	1937 Low	1937 High
Indigo, Bengal, bbls ......lb.	....	2.40	...	2.40	...	2.40
Synthetic, liquid ....lb.	.16½	.19	.16½	.19	.16½	.19
Iodine, Resublimed, jars .lb.	...	1.75	1.50	1.75	1.50	1.60
Irish Moss, ord, bales ....lb.	.10	.11	.10	.11	.11	.12
Bleached, prime, bales ..lb.	.19	.20	.19	.20	.19	.21
Iron Acetate Liq. 17°, bbls,					
delv ....lb.	.03	.04	.03	.04	.03	.04
Chloride see Ferric Chloride.					
Nitrate, coml, bbls ..100 lb.	2.32	3.11	2.32	3.11	2.32	3.25
Isobutyl Carbinol (128-132° C)					
drs, wks ....lb.	.33	.34	.33	.34	.33	.34
tks, wks ....lb.	...	.32	...	.32	...	.32
Isopropyl Acetate, tks, frt					
all'd ....lb.	...	.0510	.0510	.05½	.05½	.06½
drs, frt all'd ....lb.	.061	.066	.061	.07	.06½	.08
Ether, see Ether, isopropyl.					
Keiselguhr, dom bags, c-l,					
Pacific Coast ....ton	22.00	85.00	22.00	85.00	22.00	85.00

LEAD ACETATE

	Current Market	1938 Low	1938 High	1937 Low	1937 High
Lead Acetate, f.o.b. NY, bbls,					
White, broken ....lb.	...	.10	.10	.11	.11	.13½
cryst, bbls ....lb.	...	.10	.10	.11	.11	.13½
gran, bbls ....lb.	...	.10¾	.10¾	.11¾	.11¾	.14¼
powd, bbls ....lb.	...	.10¾	.10¾	.11¾	.11¾	.14¼
Arsenate, East, drs .....lb.	.11	.11½	.11	.13½	.11	.13½
Linoleate, solid, bbls ...lb.	...	.19	...	.19	.18	.19
Metal, c-l, NY .....100 lb.	...	5.10	4.00	5.10	4.75	7.05
Nitrate, 500 lb bbls, wks lb.	.10	.11½	.10	.11½	.09	.11½
Oleate, bbls ....lb.	.18½	.20	.18½	.20	.15	.20
Red, dry, 95% Pb_3O_4,					
delv ....lb.	...	.07¼	.06½	.08	.07¼	.0945
97% Pb_3O_4, delv .....lb.	...	.07½	.06¾	.081	.07½	.09¾
98% Pb_3O_4, delv .....lb.	...	.07¾	.07	.0835	.07¾	.10
Resinate, precip, bbls ...lb.	...	.16½	...	.16½	.14	.16½
Stearate, bbls ....lb.	.22	.23	.22	.23	.22	.23
Titanate, bbls, c-l, f.o.b.					
wks, frt all'd ....lb.	.11	.11½	.11	.11½	.10	.12
White, 500 lb bbls, wks ..lb.	...	.07	.06	.07	.06¾	.09
Basic sulfate, 500 lb bbls,					
wks ....lb.	...	.06¼	.05¼	.06¼	.06¼	.08¾
Lime, chemical quicklime,					
f.o.b., wks, bulk ....ton	7.00	8.00	7.00	8.00	6.00	8.00
Hydrated, f.o.b., wks ton	8.50	12.00	8.50	12.00	8.00	12.00
Lime Salts, see Calcium Salts.					
Lime sulfur, dealers, tks..gal.	.08	.11½	.08	.11½	...	.11
drs ....gal.	.11	.16	.11	.16	.13	.16
Linseed Meal, bgs ....ton	...	42.00	39.00	45.00	35.00	42.50
Litharge, coml, delv, bbls..lb.	...	.06¼	.05½	.066	.06¼	.08½
Lithopone, dom, ordinary,					
delv, bgs............lb.	...	.04⅛	.04⅛	.04⅝	.04¼	.04⅝
bbls ....lb.	...	.04⅜	.04⅜	.04⅞	.04½	.04⅞
High strength, bgs .....lb.	...	.05⅝	.05⅝	.06⅛	.05¾	.06⅛
bbls ....lb.	...	.05⅞	.05⅞	.06⅜	.06	.06⅜
Titanated, bgs ....lb.	...	.05⅝	.05⅝	.06⅛	.05¾	.06⅛
bbls ....lb.	...	.05⅞	.05⅞	.06⅜	.06	.06⅜
Logwood, 51°, 600 lb bbls..lb.	.09½	.11½	.09½	.11½	.08½	.11½
Solid, 50 lb boxes ......lb.	.15	.19	.15	.19	.15	.17½
Sticks ....ton	24.00	25.00	24.00	25.00	24.00	25.00

MADDER

	Current Market	1938 Low	1938 High	1937 Low	1937 High
Madder, Dutch ....lb.	.22	.25	.22	.25	.22	.25
Magnesite, calc, 500 lb bbl ton	60.00	65.00	60.00	65.00	60.00	65.00
Magnesium Carb, tech, 70 lb					
bgs, wks ....lb.	.05¾	.06½	.05¾	.07	.06	.07
Chloride flake, 375 lb drs,					
c-l, wks ....ton	39.00	42.00	39.00	42.00	39.00	42.00
Fluosilicate, crys, 400 lb					
bbls, wks ....lb.	.10	.10½	.10	.10½	.10	.10½
Oxide, calc tech. heavy bbls,					
frt all'd ....lb.	.25	.30	.25½	.30½	...	...
Light, bbls, above basis lb.	.20	.25	.20	.25½	...	...
USP Heavy, bbls, above					
basis ....lb.	.25	.30	.25	.30½	...	...
Palmitate, bbls ....lb.	.33	nom.	...	.33	.33	nom.
Silicofluoride, bbls .....lb.	.09½	.10½	.09½	.10½	.09½	.10½
Stearate, bbls ....lb.	.21	.24	.21	.24	.21	.24
Manganese acetate, drs ...lb.	...	.26½	...	.26½	.25½	.26½
Borate, 30%, 200 lb bbls lb.	.15	,16	.15	.16	.15	.16
Chloride, 600 lb cks ....lb.	.09	.12	.09	.12	.09	.12
Dioxide, tech (peroxide),					
paper bgs, c-l ....ton	...	47.50	47.50	62.50	47.50	62.50
Hydrate, bbls ....lb.	...	.32	...	.32	.	.32
Linoleate, liq, drs ......lb.	.18	.19¼	.18	.19¼	.18	.19¼
solid, precip, bbls ....lb.	...	.19	...	.19	.17½	.19
Resinate, fused, bbls ....lb.	.08¼	.08½	.08¼	.08½	.08¼	.08½
precip, drs ....lb.	...	.12	...	.12	...	.12
Sulfate, tech, anhyd, 90-					
95%, 550 lb drs .....lb.	.07	.07½	.07	.07½	.07	.07½

	Current Market		1938 Low	1938 High	1937 Low	1937 High
Mangrove, 55%, 400 lb bbls lb.	...	.04		.04	...	.04
Bark, African ton	..	23.00	23.00	24.50	25.00	27.00
Mannitol, pure cryst, cs, wks lb.	1.15	1.20	1.15	1.45	1.45	1.48
Marble Flour, blk ton	12.00	13.00	12.00	13.00	12.00	13.00
Mercury chloride (Calomel) lb.	.	1.36	1.18	1.59	1.05	1.60
Mercury metal ...76 lb. flasks	77.00	83.50	73.00	84.50	81,00	99.00
Meta-nitro-aniline lb.	.67	.69	.67	.69	.67	.69
Meta-nitro-paratoluidine 200 lb bbls lb.	1.45	1.55	1.45	1.55	1.45	1.55
Meta-phenylene diamine 300 lb bbls lb.	.80	.84	.80	.84	.80	.84
Meta-toluene-diamine, 300 lb bbls lb.	.65	.67	.65	.67	.65	.67
Methanol, denat, grd, drs, c-l, frt all'd gal.	..	.41	.30	.41	.36	.53
tks, frt all'd gal.	..	.35	.25	.35	.30	.48
Pure, drs, c-l, frt all'd gal.	...	.38	...	.38	..	.38
tks gal.	...	.33	...	.33	...	.33
95%, tks gal.	...	.31	...	.31	...	.31
97%, tks gal.	...	.32	...	.32	.	.32
Methyl Acetate, tech, tks, delv lb.	...	.06½	...	.06½	...	...
55 gal drs, delv lb.	.07½	.08	.07½	.08	...	...
C.P. 97-99%, tks, delv lb.	..	.06¼	.06¼	.07	..	...
55 gal drs, delv lb.	.07¼	.07¾	.07¼	.08½	...	...
Acetone, frt all'd, drs gal. *p*	.30	.36	.30	.40½	.34½	.58½
tks, frt all'd, drs gal. *p*	.25	.29	.25	.32½	.28½	.44½
Synthetic, frt all'd, east of Rocky M., drs gal. *p*	.38	.41	.38	.51	.42	.59½
tks, frt all'd gal.	...	.31½	.31½	.39½	.36	.49½
West of Rocky M., frt all'd, drs gal. *p*	..	.42	.42	.46	.46	.58
tks, frt all'd gal. *p*	...	.35	.35	.39½	.39½	.51
Anthraquinone lb.	...	.83	...		...	...
Butyl Ketone, tks lb.	...	.10½	..	.10½	.	.10½
Chloride, 90 lb cyl lb.	.32	.40	.32	.40	.32	.43
Ethyl Ketone, tks, frt all'd lb.	...	.05	.05	.06	...	.07½
50 gal drs, frt all'd c-l lb.	..	.06	.06	.07	...	...
Formate, drs, frt all'd lb.	.35	.36	.35	.36	.35	.39
Hexyl Ketone, pure, drs lb.	...	.60	.	.60	...	.60
Lactate, drs, frt all'd lb.	...	.30	..	.30	...	.30
Propyl carbinol, drs lb.	.60	.75	.60	.75	.60	.75
Mica, dry grd, bgs, wks lb.	..	30.00	30.00	35.00	...	35.00
Michler's Ketone, kgs lb.	.	2.50		2.50		2.50
Monoamylamine, c-l, drs, wks lb.	.52	1.00	.52	1.00	.52	1.00
Monobutylamine, lcl, drs, wks lb.	...	.65	...	.65	...	...
Monochlorobenzene, see Chlorobenzene, mono.						
Monoethanolamine, tks, wks lb.	...	.23	...	.23	.25	.30
Monomethylamine, drs, frt all'd, E. Mississippi, c-l lb.	...	.65	...	.65	...	.65
Monomethylparaminosulfate, 100 lb drs lb.	3.75	4.00	3.75	4.00	3.75	4.00
Myrobalans 25%, liq bbls lb.	.03¾	.04¼	.03¾	.04¼		.04¼
50% Solid, 50 lb boxes lb.	.04⅜	.05	.04⅜	.06¼	.06	.06¼
J1 bgs ton		24.00	23 50	30.00	26.50	30.00
J2 bgs ton	...	17.00	17.00	22.00	19.00	22.50
R2 bgs ton	...	17.25	17.00	22.00	18.75	22.00
NAPHTHA						
Naphtha, v.m.&p. (deodorized) see petroleum solvents.						
Naphtha, Solvent, water-white, tks gal.	...	.26	.26	.31	...	.31
drs, c-l gal.	...	.31	.31	.36	...	.36
NAPHTHALENE						
Naphthalene, dom, crude, bgs, wks lb.	2.25	2.85	2.25	2.85	2.00	3.00
Imported, cif, bgs lb.	.	1.85	1.40	2.25	2.20	3.00
Balls, flakes, pks lb.	...	.06½	.06½	.08	...	.08
Balls, ref'd, bbls, wks lb.	...	.05¾	.05¾	.07¼	...	.07¼
Flakes, ref'd, bbls, wks lb.	.	.05¾	.05¾	.07¼	...	.07¼
Nickel Carbonate, bbls lb.	.36	.37½	.36	.37½	.36	.37½
Chloride, bbls lb.	.18	.20	.18	.20	.18	.20
Metal ingot lb.	...	.35	...	.35	...	.35
Oxide, 100 lb kgs, NY lb.	.35	.37	.35	.37	.35	.37
Salt, 400 lb bbls, NY lb.	.13	.13½	.13	.13½	.13	.13½
Single, 400 lb bbls, NY lb.	.13	.13½	.13	.13½	.13	.13½
Nicotine, 40%, drs, sulfate, 55 lb drs lb.	...	.76	...	.76	...	.76
Nitre Cake, blk ton	...	16.00	...	16.00	...	16.00
Nitrobenzene, redistilled, 1000 lb drs, wks lb.	.08	.10	.08	.10	.08	.10
tks lb.	...	.07½	.	.07½	...	.07½
Nitrocellulose, c-l, l-c-l, wks lb.	.22	.29	.22	.29	.26	.29
Nitrogen Sol. 45½% ammon., f.o.b. Atlantic & Gulf ports, tks, unit ton	...	1.04	1.01	1.04	...	...
Nitrogenous Mat'l, bgs, imp unit	...	2.50	2.35	2.65	2.55	3.55
dom, Eastern wks unit	.	2.50	2.50	2.75	2.50	4.25
dom, Western wks unit	..	2.25	2.20	2.35	2.25	3.75
Nitronaphthalene, 550 lb bbls lb.	.24	.25	.24	.25	24	.25
Nutgalls Alleppo, bgs lb.		.23	.23	.23	.20	.22
Chinese, bgs lb.	no prices		...	..	.20	.22
OAK BARK						
Oak Bark Extract, 25%, bbls lb.	...	.03⅛	...	.03⅛	...	.03⅛
tks lb.	...	.02¾	...	.02¾	...	.02¾
Octyl Acetate, tks, wks lb.	.16	.17	.16	.17	.16	.17

o Country is divided in 4 zones, prices varying by zone; *p* Country is divided into 4 zones. Also see footnote directly above; *q* Naphthalene quoted on Pacific Coast F.A.S. Phila. or N. Y.

	Current Market		1938 Low	1938 High	1937 Low	1937 High
Orange-Mineral, 1100 lb cks NY ... lb.		.10¼	.09½	.10½	.10¼	.12¾
Orthoaminophenol, 50 lb kgs lb.	2.15	2.25	2.15	2.25	2.15	2.25
Orthoanisidine, 100 lb drs lb.	.70	.74	.70	.74	.70	.74
Orthochlorophenol, drs ... lb.	...	.32	.32	.75	.35	.75
Orthocresol, drs, wks ... lb.	.16½	.17½	.13½	.17½	.13½	.14½
Orthodichlorobenzene, 1000 lb drs ... lb.	.06	.07	.06	.07	.05	.07
Orthonitrochlorobenzene, 1200 lb drs, wks ... lb.	.15	.18	15	.18	.28	.29
Orthonitroparachlorphenol, tins ... lb.	...	.75	...	.75	.70	.75
Orthonitrophenol, 350 lb drs ... lb.	.85	.90	.85	.90	.85	.90
Orthonitrotoluene, 1000 lb drs, wks ... lb.	.08	.10	.08	.10	.07	.10
Orthotoluidine, 350 lb bbls, l-c-l ... lb.	.16	.17	.16	.17	.14	.17
Osage Orange, cryst, bbls .. lb.	.17	.25	.17	.25	.17	.25
51° liquid ... lb.	.07	.08	.07	.08	.07	.08
Paraffin, rfd, 200 lb bgs						
122-127° M P ... lb.	.03¾	.039	.03¾	.04½	.0445	.04½
128 132° M P ... lb.	.04	.0435	.04	.049	.04¾	.049
133-137° M P ... lb.	...	.0465	.0465	.05¾	.05½	.05¾
Para aldehyde, 99%, tech, 110-55 gal drs, delv .. lb.	...	.16	.16	.18	.16	.18
Aminoacetanilid, 100 lb kgs ... lb.	...	.85	...	.85	...	.85
Aminohydrochloride, 100 lb kgs ... lb.	1.25	1.30	1.25	1.30	1.25	1.30
Aminophenol, 100 lb kgs lb.	...	1.05	...	1.05	...	1.05
Chlorophenol, drs ... lb.	.30	.45	.30	.45	.30	.45
Dichlorobenzene, 200 lb drs, wks ... lb.	.11	.12	.11	.12	.11	.20
Formaldehyde, drs, wks lb.	.34	.35	.34	.35	.34	.35
Nitroacetanilid, 300 lb bbls ... lb.	.45	.52	.45	.52	.45	.52
Nitroaniline, 300 lb bbls, wks ... lb.	.45	.47	.45	.47	.45	.47
Nitrochlorobenzene, 1200 lb drs, wks ... lb.	.15	.16	.15	.16	.23½	.24
Nitro-orthotoluidine, 300 lb bbls ... lb.	2.75	2.85	2.75	2.85	2.75	2.85
Nitrophenol, 185 lb bbls lb.	.35	.37	.35	.37	.35	.37
Nitrosodimethylaniline, 120 lb bbls ... lb.	.92	.94	.92	.94	.92	.94
Nitrotoluene, 350 lb bbls lb.	...	.35	...	.35	...	.35
Phenylenediamine, 350 lb bbls ... lb.	1.25	1.30	1.25	1.30	1.25	1.30
Toluenesulfonamide, 175 lb bbls ... lb.	.70	.75	.70	.75	.70	.75
tks, wks ... lb.	.	.31	.	.31	.	.31
Toluenesulfonchloride, 410 lb bbls, wks ... lb.	.20	.22	.20	.22	.20	.22
Toluidine, 350 lb bbls, wks ... lb.	.56	.58	.56	.58	.56	.58
Paris Green, dealers, drs .. lb.	.23	.26	.23	.26½	.22	.26½
Pentane, normal, 28-38° C, group 3, tks ... gal.	...	.08½	...	.08½	.08½	.09½
drs, group 3 ... gal.	.11½	.16	.11½	.16	.12½	.16
Perchlorethylene, 100 lb drs, frt all'd ... lb.	...	.10½	...	.10½	...	.10½
Petrolatum, dark amber, bbls ... lb.	.02⅝	.02¾	.02⅝	.03⅞	.02⅝	.03
Light, bbls ... lb.	.03⅛	.03⅜	.03⅛	.03⅜	.03⅛	.03⅜
Medium, bbls ... lb.	.02⅞	.03⅛	.02⅞	.03⅛	.02⅞	.03⅛
Dark green, bbls ... lb.	.02½	.02¾	.02½	.02¾	.02½	.02¾
Red, bbls ... lb.	.02½	.03⅝	.02½	.03⅝	.02⅝	.03¾
White, lily, bbls ... lb.	.05¼	.07⅛	.05¼	.07⅛	.06	.06¼
White, snow, bbls ... lb.	.06¼	.08⅛	.06¼	.08⅛	.07	.07¼
Petroleum Ether, 30-60°, group 3, tks ... gal.	...	.13	...	.13	...	.13
drs, group 3 ... gal.	.14	.17	.14	.17	.15	.17

PETROLEUM SOLVENTS AND DILUENTS

	Current Market		1938 Low	1938 High	1937 Low	1937 High
Cleaners naphthas, group 3, tks, wks ... gal.	.06⅜	.06⅝	.06⅜	.07⅜	.06⅞	.07⅞
East Coast, tks, wks gal.	...	.10	...	.10	.09½	10
Hydrogenated, naphthas, frt all'd East, tks ... gal.	...	.16	...	.16	...	.16
No. 2, tks ... gal.	...	.18	...	.18	...	.18
No. 3, tks ... gal.	...	.16	...	.16	...	.16
No. 4, tks ... gal.	...	.18	...	.18	...	.18
Lacquer diluents, tks, Bayonne ... gal.	.12	.12½	.12	.12½	.12	.12½
Group 3, tks ... gal.	.07⅜	.07⅝	.07⅜	.08⅜	.07⅞	.08⅞
Naphtha, V.M.P., East, tks, wks ... gal.	...	.09½	.09½	.10	.10	.11
Group 3, tks, wks ... gal.	.06⅜	.06⅝	.06⅜	.07⅜	.06⅞	.07⅞
Petroleum thinner, 43-47, East, tks, wks ... gal.	.09½	.10	.08½	.10	.09	.10
Group 3, tks, wks ... gal.	.05⅜	.05⅝	.05⅜	.06⅜	.05⅞	.06⅞
Rubber Solvents, stand grd, East, tks, wks ... gal.	.09½	.10	.09½	.10	.09½	.10
Group 3, tks, wks ... gal.	.06⅜	.06⅝	.06⅜	.07⅜	.06⅞	.07⅞
Stoddard Solvent, East, tks, wks ... gal.	.	.10	.09½	.10	.09½	.10
Group 3, tks, wks ... gal.	.05⅞	.06⅛	.05⅞	.06⅞	.06⅜	.07⅜
Phenol, 250-100 lb drs ... lb.	.14½	.15½	.14½	.15½	.13¼	.15½
tks, wks ... lb.	...	.13½	...	.13½	.12¾	.13½
Phenyl-Alpha-Naphthylamine, 100 lb kgs ... lb.	...	1.35	...	1.35	...	1.35
Phenyl Chloride, drs ... lb.	...	.17	...	.17	.16	.17
Phenylhydrazine Hydrochloride, com ... lb.	...	1.50	...	1.50	...	1.50

	Current Market		1938 Low	1938 High	1937 Low	1937 High
Phloroglucinol, tech, tins . . lb.	15.00	16.50	15.00	16.50	15.00	16.50
CP, tins . . . lb.	20.00	22.00	20.00	22.00	20.00	22.00
Phosphate Rock, f.o.b. mines						
Florida Pebble, 68% basis ton	...	1.85	...	1.85	...	1.85
70% basis . . . ton	...	2.35	...	2.35	...	2.35
72% basis . . . ton	...	2.85	...	2.85	...	2.85
75-74% basis . . . ton	...	3.85	...	3.85	...	3.85
75% basis . . . ton	...	5.50	...	5.50	...	5.50
Tennessee, 72% basis ton	...	4.50	...	4.50	...	4.50
Phosphorus Oxychloride 175						
lb cyl . . . lb.	.16	.20	.16	.20	.16	.20
Red, 110 lb cases . . . lb.	.40	.44	.40	.44	.40	.44
Sesquisulfide, 100 lb cs . . lb.	.38	.44	.38	.44	.38	.44
Trichloride, cyl . . . lb.	.15	.18	.15	.18	.15	.20
Yellow, 110 lb cs, wks . lb.	.24	.30	.24	.30	.24	.33
Phthalic Anhydride, 100 lb						
drs, wks . . . lb.	...	.14½	...	.14½	.14½	.15½
Pine Oil, 55 gal drs or bbls						
Destructive dist . . . lb.	.46	.48	.46	.55	.49	.65
Steam dist wat wh bbls gal.	...	.59	...	.59	.59	.79
tks . . . gal.	...	.54	...	.54	.54	.74
Pitch Hardwood, wks . . . ton	18.25	18.75	18.25	18.75	15.00	18.75
Coaltar, bbls, wks . . . ton	...	19.00	...	19.00	...	19.00
Burgundy, dom, bbls, wks lb.	.05½	.06½	.05½	.06½	.03½	.06½
Imported . . . lb.	.15	.16	.15	.16	.11	.16
Petroleum, see Asphaltum in Gums' Section.						
Pine, bbls . . . bbl.	6.00	6.25	5.75	6.25	5.75	6.50
Stearin, drs . . . lb.	.03	.04½	.03	.04½	.03	.04½
Platinum, ref'd . . . oz.	30.00	36.50	30.00	39.00	32.00	68.00
POTASH						
Potash, Caustic, wks, sol . . lb.	.06¼	.06½	.06¼	.06½	.06¼	.06½
flake . . . lb.	.07	.07⅜	.07	.07⅜	.07	.07⅜
Liquid, tks . . . lb.	...	.02⅞	...	.02⅞	...	.02⅞
Manure Salts, imported						
30% basis, blk . . . unit	...	.58½	.	.58½	.55	.58½
Potassium Abietate, bbls . . lb.	...	.09	.08	.13	...	...
Acetate, tech, bbls, delv lb.	...	.26	.26	.28	.26	.28
Bicarbonate, USP, 320 lb						
bbls . . . lb.	...	.18	...	.18	.09	.18
Bichromate Crystals, 725 lb						
cks* . . . lb.	.08¾	.09¼	.08¾	.09¼	.08¾	.09
Binoxalate, 300 lb bbls . . lb.	...	.23	...	.23	...	.23
Bisulfate, 100 lb kgs . . . lb.	.15½	.18	.15½	.18	.15½	.18
Carbonate, 80-85% calc 800						
lb cks . . . lb.	.06½	.07	.06½	.07	.06½	.07
liquid, tks . . . lb.	...	.02⅞	...	.02⅞	.02¾	.02⅞
drs, wks . . . lb.	.03	.03½	.03	.03½	.02⅞	.03½
Chlorate crys, 112 lb kgs,						
wks . . . lb.	.09¼	.09½	.09¼	.09½	.09¼	.09½
gran, kgs . . . lb.	.12	.13	.12	.13	.12	.13
powd, kgs . . . lb.	.08½	.08¾	.08½	.08¾	.08½	.08¾
Chloride, crys, bbls . . . lb.	.04	.04¾	.04	.04¾	.04	.04¾
Chromate, kgs . . . lb.	.19	.28	.19	.28	.28	.29
Cyanide, 110 lb cases . . . lb.	.50	.55	.50	.57½	.55	.57½
Iodide, 250 lb bbls . . . lb.	...	1.13	.93	1.13	.93	1.15
Metabisulfite, 300 lb bbls lb.	.12	.13½	.12	.15	.11	.15
Muriate, bgs, dom, blk unit	...	.53½	...	.53½	.50	.53½
Oxalate, bbls . . . lb.	.25	.26	.25	.26	.25	.26
Perchlorate, kgs, wks . . . lb.	.09	.10½	.09	.11½	.09½	.11
Permanganate, USP, crys,						
500 & 1000 lb drs, wks lb.	.18½	.19½	.18½	.19½	.18½	.19½
Prussiate, red, bbls . . . lb.	.30½	.34	.30½	.37	.35	.37
Yellow, bbls . . . lb.	.15	.16	.15	.16	.15	.18
Sulfate, 90% basis, bgs ton	...	38.00	...	38.00	...	36.25
Titanium Oxalate, 200 lb						
bbls . . . lb.	.35	.40	.35	.40	.33	.40
Pot & Mag Sulfate, 48% basis						
bgs . . . ton	...	25.75	...	25.75	24.75	25.75
Propane, group 3, tks . . . lb.	.03	.04⅜	.03	.04⅜	.03	.04⅜
Putty, coml, tubs . . . 100 lb.	...	3.00	2.25	3.00	2.90	3.00
Linseed Oil, kgs . . . 100 lb.	...	4.50	4.00	4.65	4.65	4.75
Pyrethrum, conc liq:						
2.4% pyrethrins, drs, frt						
all'd . . . gal.	...	5.95	5.00	6.75	4.15	5.25
3.6% pyrethrins, drs, frt						
all'd . . . gal.	...	8.90	7.65	9.95	6.10	7.85
Flowers, coarse, Japan,						
bgs . . . lb.	.26	.27	.18	.28½	.12¾	.18
Fine powd, bbls . . . lb.	.27	.28	.19	.30	.14	.19
Pyridine, denat, 50 gal drs gal.	...	1.63	1.53	1.63	1.30	1.55
Refined, drs . . . lb.	...	.50	.45	.50	...	...
Pyrites, Spanish cif Atlantic						
ports, blk . . . unit	.12	.13	.12	.13	.12	.13
Pyrocatechin, CP, drs, tins lb.	2.15	2.75	2.15	2.75	2.15	2.75
Quebracho, 35% liq tks . . . lb.	...	.03⅜	.03	.03⅜	.02⅞	.03
450 lb bbls, c-l . . . lb.	...	.04⅛	.03½	.04⅛	.03½	.03⅞
Solid, 63%, 100 lb bales						
cif . . . lb.	...	.04	...	.04	.03⅞	.04
Clarified, 64%, bales lb.	...	.04¼	...	.04¼	.04¼	.04⅜
Quercitron, 51 deg liq, 450 lb						
bbls . . . lb.	.07½	.08½	.06	.08½	.06	.06½
Solid, drs . . . lb.	.10	.12	.10	.12	.10	.12
R SALT						
R Salt, 250 lb bbls, wks . . . lb.	.52	.55	.52	.55	.52	.55
Resorcinol tech, cans . . . lb.	.75	.80	.75	.80	.75	.80
Rochelle Salt, cryst . . . lb.	.17¼	.18¼	.15	.18¼	.14½	.15½
Powd, bbls . . . lb.	.16¾	.17¼	.16	.18½	.13½	.16½
Rosin Oil, bbls, first run gal.	.45	.47	.45	.60	.52	.73
Second run . . . gal.	.47	.49	.47	.62	.54	.75
Third run, drs . . . gal.	.51	.53	.51	.66	.58	.79

* Spot price is ½c higher.

	Current Market		1938 Low	1938 High	1937 Low	1937 High
Rosins 600 lb bbls, 280 lb unit ex. yard NY:						
B	...	5.10	4.65	6.00	5.50	10.00
D	...	5.30	4.75	6.00	5.50	10.35
E	...	5.40	4.90	6.00	5.75	10.25
F	...	5.65	5.05	7.00	6.87½	10.80
G	...	5.75	5.25	7.05	6.87½	10.85
H	...	5.75	5.25	7.15	6.90	10.85
I	...	5.77½	5.25	7.15	6.95	10.90
K	...	5.80	5.25	7.25	6.95	10.90
M	..	5.90	5.25	7.40	7.05	11.00
N	...	6.90	6.20	7.50	7.10	11.05
WG	...	7.30	6.75	8.45	7.65	11.75
WW	...	7.95	7.55	9.15	8.00	13.75
Rosins, Gum, Savannah (280 lb unit):**						
B	...	3.75	3.25	4.60	4.25	8.75
D	...	4.00	3.50	4.60	4.25	9.00
E	...	4.10	3.55	4.60	4.25	9.10
F	...	4.30	3.90	5.60	5.50	9.55
G	...	4.40	4.10	5.65	5.60	9.60
H	...	4.40	4.20	5.75	5.70	9.60
I	...	4.40	4.20	5.85	5.70	9.65
K	...	4.40	4.20	6.00	5.70	9.65
M	...	4.40	4.20	6.15	5.80	9.75
N	...	5.35	4.80	6.20	5.85	9.75
WG	...	5.80	5.40	7.05	6.40	10.50
WW	...	6.30	6.10	7.75	6.75	12.50
X	...	6.30	6.10	7.75	6.75	12.50
Rosin, Wood, c-l, FF grade, NY	5.35	6.05	5.05	6.40	6.40	10.72
Rotten Stone, bgs mines . . ton	...	35.00	...	35.00	...	35.00
Imported, lump, bbls . . . lb.	...	.12	...	.12	...	...
Powdered, bbls . . . . . . lb.	.08½	.10	.08½	.10	...	...

SAGO FLOUR

Sago Flour, 150 lb bgs . . . lb.	.02½	.03½	.02½	.03¾	.02¾	.03¾
Sal Soda, bbls, wks . . . 100 lb.	...	1.20	...	1.20	1.15	1.20
Salt Cake, 94-96%, c-l, wks ton	19.00	23.00	19.00	23.00	19.00	23.00
Chrome, c-l, wks . . . . . . ton	11.00	12.00	11.00	12.00	11.00	12.00
Saltpetre, gran, 450-500 lb bbls . . . . lb.	.06½	.069	.06½	.069	.06	.069
Cryst, bbls . . . . lb.	.07½	.0865	.07½	.0865	.07	.0865
Powd, bbls . . . . lb.	.07½	.079	.07½	.079	.07	.079
Satin, White, pulp, 550 lb bbls . . . . lb.	.01¼	.01½	.01¼	.01½	.01¼	.01½
Schaeffer's Salt, kgs . . . . lb.	.46	.48	.46	.48	.46	.48
Shellac, Bone dry, bbls . . lb. r	.19	.20	.16½	.20	.17	.22
Garnet, bgs . . . . lb.	.12½	.13	.12½	.15	.14	.17
Superfine, bgs . . . . . . lb. s	.11	.11½	.11	.13½	.13	.18½
T. N., bgs . . . . lb. s	.10½	.11	.10½	.12½	.12	.14½
Silver Nitrate, vials . . . . . oz.	.31½	.33½	.33½	.34⅞	.32⅝	.35½
Slate Flour, bgs, wks . . . . ton	9.00	10.00	9.00	10.00	9.00	10.00
Soda Ash, 58% dense, bgs, c-l, wks . . . . 100 lb.	...	1.10	...	1.10	...	1.10
58% light, bgs . . . . . 100 lb.	...	1.08	...	1.08	...	1.08
blk . . . . 100 lb.	...	.90	...	.90	...	.90
paper bgs . . . . 100 lb.	...	1.05	...	1.05	...	1.05
bbls . . . . 100 lb.	...	1.35	...	1.35	...	1.35
Caustic, 76% grnd & flake, drs . . . . 100 lb.	...	2.70	...	2.70	...	2.70
76% solid, drs . . . . . 100 lb.	...	2.30	...	2.30	...	2.30
Liquid sellers, tks . . 100 lb.	...	1.97½	...	1.97½	...	1.97½
Sodium Abietate, drs . . . . . lb.	...	.11	.10	.13	.08	.13
Acetate, 60% tech, gran, powd, flake, 450 lb bbls, **wks . . . . lb.**	.04	.05	.04	.05	.04¼	.05
anhyd, drs, **delv . . . . . lb.**	...	.08¼	.	.08¼	...	..
Alignate, drs . . . . lb.	...	.70	.69	.70	.64	.69
Antimoniate, bbls . . . . . . lb.	.12	.12½	.12	.15¼	.13¾	.16¼
Arsenate, drs . . . . lb.	.08	.08½	.08	.08½	.08	.11½
Arsenite, liq, drs . . . . . . gal.	.30	.33	.30	.33	.33	.40
Dry, gray, drs, wks . . lb.	.07½	.09½	.07½	.09½	...	...
Benzoate, USP, kgs . . . . lb.	.46	.48	.46	.48	.46	.48
Bicarb, powd, 400 lb bbl, wks . . . . 100 lb.	...	1.85	...	1.85	1.75	1.85
Bichromate, 500 lb cks, wks* . . . . lb.	.06¾	.07¼	.06¾	.07¼	.06½	.07¼
Bisulfite, 500 lb bbl, **wks lb.**	.03¼	.036	.03¼	.036	.03¼	.036
35-40% sol bbls, wks 100 lb.	1.40	1.80	1.40	1.80	...	...
Chlorate, bgs, wks . . . . . lb.	.06¼	.07½	.06¼	.07½	.06¼	.07½
Cyanide, 96-98%, 100 & 250 lb drs, wks . . . . . . lb.	.14	.15	.14	.17½	.15½	.17½
Diacetate, 33-35% acid, bbls, lcl, delv . . . . lb.	...	.09	...	.09	...	...
Fluoride, white 90%, 300 lb bbls, wks . . . . lb.	.07½	.08¼	.07½	.08¼	.07½	.08¼
Hydrosulfite, 200 lb bbls, f.o.b. wks . . . . lb.	.16	.17	.16	.17	.16	.17
Hyposulfite, tech, pea crys 375 lb bbls, wks 100 lb.	...	2.80	2.50	2.80	2.50	3.00
Tech, reg cryst, 375 lb bbls, wks . . . . . . 100 lb.	2.45	2.80	2.40	2.80	2.40	2.75
Iodide, jars . . . . lb.	...	2.10	1.90	2.10	1.90	1.95
Metal, drs, 280 lbs . . . . . lb.	...	.19	...	.19	...	.19
Metanilate, 150 lb bbls . . lb.	.41	.42	.41	.42	.41	.42
Metasilicate, gran, c-l, wks . . . . 100 lb.	...	2.20	2.15	2.20	...	2.15
cryst, drs, c-l, **wks 100 lb.**	...	2.90	2.75	2.90	...	2.75
Monohydrate, bbls . . . . . lb.	...	.023	...	.023	...	.023
Naphthenate, drs . . . . . . lb.	.12	.19	.12	.19	.09	.19
Naphthionate, 300 lb bbl lb.	.52	.54	.52	.54	.52	.54

r Bone dry prices at Chicago 1c higher; Boston ½c; Pacific Coast 2c; Philadelphia deliveries f.o.b. N. Y.; refined 6c higher in each case; s T. N. and Superfine prices quoted f.o.b. N. Y. and Boston; Chicago prices 1c higher; Pacific Coast 3c; Philadelphia f.o.b. N. Y. * Spot price is ⅛c higher. **Dec. 23.

	Current	Market	1938 Low	1938 High	1937 Low	1937 High
Sodium (continued):						
Nitrate, 92%, crude, 200 lb bgs, c-l, NY ....ton	...	28.30	...	28.30	26.80	28.30
100 lb bgs ....ton	...	29.00	...	29.00	27.50	29.00
Bulk ....ton	...	27.00	...	27.00	25.50	27.00
Nitrite, 500 lb bbls .....lb.	.06¾	.11½	.06¾	.11½	.07	.10
Orthochlorotoluene, sulfonate, 175 lb bbls, wks ..lb.	.25	.27	.25	.27	.25	.27
Perborate, drs, 400 lbs ..lb.	.14¾	.15¼	.14¾	.15¼	.14¾	.15¼
Peroxide, bbls, 400 lb ...lb.	...	.17	...	.17	...	.17
Phosphate, di-sodium, tech, 310 lb bbls, wks 100 lb.	...	2.05	...	2.05	1.90	2.05
bgs, wks ......100 lb.	...	1.85	...	1.85	1.70	1.85
Tri-sodium, tech, 325 lb bbls, wks ....100 lb.	...	2.20	...	2.20	2.05	2.20
bgs, wks ....100 lb.	...	2.00	...	2.00	1.85	2.00
Picramate, 160 lb kgs ...lb.	.65	.67	.65	.67	.65	.67
Prussiate, Yellow, 350 lb bbl. wks ....lb.	.09½	.10	.09	.11½	.10	.11½
Pyrophosphate, anhyd, 100 lb bbls fob wks frt eq lb.	...	.0530	.0530	.10	...	.10
Sesquisilicate, drs, c-l, wks ....100 lb.	...	2.80	2.80	3.00	...	...
Silicate, 60°, 55 gal drs, wks ......100 lb.	1.65	1.70	1.65	1.70	1.65	1.70
40°, 55 gal drs, wks 100 lb.	...	.80	...	.80	...	.80
tks, wks ......100 lb.	...	.65	...	.65	...	.65
Silicofluoride, 450 lb bbls NY ....lb.	.04¾	.05	.04¾	.06½	.05¾	.07
Stannate, 100 lb drs ....lb.	.31½	.34	.25½	.34	.28	.44
Stearate, bbls ....lb.	.19	.24	.19	.24	.19	.24
Sulfanilate, 400 lb bbls..lb.	.16	.18	.16	.18	.16	.18
Sulfate Anhyd, 550 lb bgs* c-l, wks ....100 lb. †	1.45	1.90	1.45	1.90	1.45	1.90
Sulfide, 80% cryst, 440 lb bbls, wks ....lb.	...	.02¼	...	.02¼	...	.02¼
Solid, 650 lb drs, c-l, wks ....lb.	...	.03	...	.03	...	.02
Sulfite, cryst, 400 lb bbls, wks ....lb.	.023	.02½	.023	.02½	.023	.02½
Sulfocyanide, drs ......lb.	.28	.47	.28	.47	.28	.47
Sulforicinoleate, bbls ...lb.		.12	.	.12	...	.12
Tungstate, tech, crys, kgs lb.	1.05	1.10	1.05	1.35	.85	.90
Sorbitol, com, solut., wks, c-l drs, wks ....†..lb.	...	.15½	.15½	.19	...	.25
Spruce Extract, ord, tks ..lb.	...	.01⅛	...	.01⅛	.01	.01⅛
Ordinary, bbls ....lb.	...	.01⅝	...	.01⅝	.01½	.01⅝
Super spruce ext, tks ...lb.	...	.01⅜	...	.01⅜	.01⅜	.01⅝
Super spruce ext, bbls ..lb.	...	.01⅞	...	.01⅞	...	.01⅞
Super spruce ext, powd, bgs ....lb.	...	.04	...	.04	.04	.04¼
Starch, Pearl, 140 lb bgs 100 lb.	2.50	2.70	2.40	3.18	2.93	4.53
Powd, 140 lb bgs ...100 lb.	2.60	2.80	2.50	3.28	3.03	4.63
Potato, 200 lb bgs ......lb.	.04	.05	.03½	.05½	.04½	.05½
Imp, bgs ....lb.	.05	.06	.05	.06	.05	.06
Rice, 200 lb bbls ......lb.	.06¼	.07¼	.06¼	.07¼	.	.07¼
Wheat, thick, bgs .....lb.	.06¼	nom.	.06¼	.07	.07	.08½
Strontium carbonate, 600 lb bbls, wks ....lb.	.07¼	.07½	.07¼	.07½	.07¼	.07½
Nitrate, 600 lb bbls, NY lb.	.07¾	.08¼	.07¾	.09¼	.07¾	.08¾
Sucrose octa-acetate, den, grd, bbls, wks ....lb.	...	.45	...	.45	...	.45
tech, bbls, wks ....lb.	...	.40	.	.40	...	.40
Sulfur, crude, f.o.b. mines ton	...	16.00	16.00	19.00	18.00	19.00
Flour, coml, bgs ....100 lb.	1.65	2.35	1.65	2.35	1.65	2.35
bbls ....100 lb.	1.95	2.70	1.95	2.70	1.95	2.70
Rubbermakers, bgs..100 lb.	2.20	2.80	2.20	2.80	2.20	2.80
bbls ....100 lb.	2.55	3.15	2.55	3.15	2.55	3.15
Extra fine, bgs .....100 lb.	2.85	3.00	2.85	3.00	2.85	3.00
Superfine, bgs ......100 lb.	2.65	2.80	2.65	2.80	2.65	2.80
bbls ....100 lb.	2.25	3.10	2.25	3.10	2.25	3.10
Flowers, bgs ....100 lb.	3.00	3.75	3.00	3.75	3.00	3.75
bbls ....100 lb.	3.35	4.10	3.35	4.10	3.35	4.10
Roll, bgs ....100 lb.	2.35	3.10	2.35	3.10	2.35	3.10
bbls ....100 lb.	2.50	3.25	2.50	3.25	2.50	3.25
Sulfur Chloride, 700 lb drs, wks ....lb.	.03	.04	.03	.04	.02½	.04
Sulfur Dioxide, 150 lb cyl..lb.	.07	.09	.07	.09	.07	.09
Multiple units, wks .....lb.	.04½	.07	.04½	.07	.04½	.07
tks, wks ....lb.	.04	.05	.04	.05	.04	.05
Refrigeration, cyl, wks..lb.	.16	.17	.16	.17	.15	.17
Multiple units, wks ....lb.	.07½	.10	.07½	.10	.07½	.10
Sulfuryl Chloride ....lb.	.15	.40	.15	.40	.15	.40
Sumac, Italian, grd ......ton	..	67.00	62.00	68.00	58.50	65.00
Extract, 42°, bbls ......lb.	.05¼	.06¼	.05¼	.06¼	.05¼	.06¼
Superphosphate, 16% bulk, wks ....ton	...	8.00	8.00	9.00	8.25	9.00
Run of pile ....ton	...	7.50	7.50	8.50	8.00	8.50
Triple, 40-48%, a.p.a. bulk, wks, Balt. unit ......ton	...	.70	.70	.85	.70	.85
Talc, Crude, 100 lb bgs, NY ton	13.00	15.00	13.00	15.00	13.00	15.00
Ref'd, 100 lb bgs, NY ton	14.00	16.00	14.00	16.00	14.00	16.00
French, 220 lb bgs, NY ton	23.00	30.00	23.00	30.00	23.00	30.00
Ref'd, white, bgs, NY ton	45.00	60.00	45.00	60.00	45.00	60.00
Italian, 220 lb bgs to arr ton	60.00	62.00	60.00	62.00	60.00	62.00
Ref'd, white, bgs, NY ton	65.00	70.00	65.00	70.00	65.00	70.00
Tankage Grd, NY .....unit ‖	..	3.15	2.50	3.15	3.00	4.40
Ungrd ....unit ‖	...	3.00	2.35	3.00	2.80	4.35
Fert grade, f.o.b. Chgo unit ‖	..	3.00	2.25	3.00	2.75	4.00
South American cif unit ‖	...	3.35	3.00	3.45	3.15	4.25
Tapioca Flour, high grade, bgs ....lb.	.02	.05½	.02	.05½	.03¼	.05½
Tar Acid Oil, 15%, drs ..gal.	.21	.24	.21	.25½	.21	.25½
25%, drs ....gal.	.25	.28	.25	.29½	.24½	.29½
Tar, pine, delv, drs .....gal.	...	.26	...	.26	...	.26
tks, delv, E. cities .....gal.	...	.20	...	.20	...	.20
Tartar Emetic, tech, bbls..lb.	.27¾	.28	.26¾	.28	.24¾	.27
USP, bbls ....lb.	.33	.33½	.32	.33½	.30	.32½

† Bags 15c lower; ‖ + 10; *Bbls. are 20c higher.

Current

Terpineol
Zinc Dust

	Current Market		1938 Low	1938 High	1937 Low	1937 High
Terpineol, den grade, drs . . lb.	...	.17	...	.17	.13¼	.14¾
Tetrachlorethane, 650 lb drs lb.	.08	.08½	.08	.08½	.08	.08½
Tetrachloroethylene, drs, tech . . . lb.	...	.09½	...	.09½	...	.10½
Tetralene, 50 gal drs, wks lb.	.12	.13	.12	.13	.12	.13
Thiocarbanilid, 170 lb bbls . . lb.	.20	.25	.20	.25	.20	.25
Tin, crystals, 500 lb bbls, wks lb.	.36	.36½	.31	.36½	.33	.46
Metal, NY . . . lb.	...	.4665	.3570	.4675	.41	.66
Oxide, 300 lb bbls, wks . . lb.	.50	.52	.44	.50	.48	.62
Tetrachloride, 100 lb drs, wks . . . lb.	...	.23½	.18½	.23½	.21	.32
Titanium Dioxide, 300 lb bbls lb.	.14½	.16	.14½	.17	.16¼	.17
Barium Pigment, bbls . . lb.	.05⅝	.05⅞	.05⅝	.06⅜	.06	.06⅜
Calcium Pigment, bbls . . lb.	.05⅝	.05⅞	.05⅝	.06⅜	.06	.06⅜
Toluidine, mixed, 900 lb drs, wks . . . lb.	.26	.27	.26	.27	.26	.27
Toluol, 110 gal drs, wks . . gal.	...	.27	.27	.35	...	.35
8000 gal tks, frt all'd . . gal.	...	.22	.22	.30	...	.30
Toner Lithol, red, bbls . . . . lb.	.75	.80	.75	.80	.75	.80
Para, red, bbls . . . lb.	.75	.80	.75	.80	...	.75
Toluidine, bgs . . . lb.	...	1.35	...	1.35	...	1.35
Triacetin, 50 gal drs, wks lb.	...	.36	...	.36	...	.36
Triamyl Borate, lcl, drs, wks lb.	...	.27	...	.27	...	.27
Triamylamine, c-l, drs, wks lb.	.77	1.25	.77	1.25	.77	1.25
Tributylamine, lcl, drs, wks lb.	...	.70	...	.70	...	...
Tributyl citrate, drs, frt all'd lb.	...	.45	...	.45	...	.45
Tributyl Phosphate, frt all'd lb.	...	.42	.42	.50	...	.50
Trichlorethylene, 600 lb drs, frt all'd E. Rocky Mts . . lb.	.09	.09½	.089	.09½	.089	.094
Tricresyl phosphate, tech, drs lb.	.23	.37½	.23	.39	.22½	.26½
Triethanolamine, 50 gal drs wks . . . lb.	.21	.22	.21	.22	.21	.30
tks, wks . . . lb.	...	.20	...	.20	.20	.25
Triethylene glycol, drs, wks lb.	...	.26	...	.26	...	...
Trihydroxyethylamine Oleate, bbls . . . lb.	...	.30	...	.30	...	...
Stearate, bbls . . . lb.	...	.30	...	.30	...	...
Trimethyl Phosphate, drs, lcl fob dest . . . lb.	...	.50	...	.50	...	...
Trimethylamine, c-l, drs, frt all'd E. Mississippi . . . . . lb.	...	1.00	...	1.00	...	1.00
Triphenylguanidine . . . lb.	.58	.60	.58	.60	.58	.60
Triphenyl Phosphate, drs . . lb.	...	.38	.34	.38	...	...
Tripoli, airfloated, bgs, wks ton	26.00	30.00	26.00	30.00	25.00	30.00
Turpentine (Spirits), c-l, NY dock, bbls . . . gal.	...	.29½	.26½	.31½	.31	.47
Savannah, bbls . . . gal.	...	.24*	.20½	.30¾	.25	.42
Jacksonville, bbls . . . gal.	...	.23½*	.20½	.30¾	.25	.41
Wood Steam dist, bbls, c-l, NY . . . gal.	24.2	.25	24.2	.31	.30	.44
Wood, dest dist, c-l, drs, delv E. cities . . . gal.	.22	.24	.22	.36	...	...
Urea, pure, 112 lb cases . . lb.	.14½	.15½	.14½	.15½	.14½	.15½
Fert grade, bgs, c.i.f. . . ton	...	...	...	...	...	...
c.i.f. S.A. points . . . . ton	95.00	110.00	95.00	110.00	95.00	110.00
Dom, f.o.b., wks . . . ton	95.00	101.00	95.00	101.00	95.00	101.00
Urea Ammonia liq 55% NH_3, tks . . . unit	...	nom.	1.00	1.04	1.00	1.04
Valonia beard, 42%, tannin bgs . . . ton	...	45.00	45.00	52.00	35.00	52.00
Cups, 32% tannin, bgs . . ton	...	30.00	30.00	37.50	31.50	36.00
Extract, powd, 63% . . . . lb.	...	.06	...	.06	...	...
Vanillin, ex eugenol, 25 lb tins, 2000 lb lots . . . . . lb.	...	2.20	2.10	3.10	3.10	3.65
Ex-guaiacol . . . lb.	...	2.10	2.00	3.00	3.00	3.55
Ex-lignin . . . lb.	...	2.10	2.00	2.25		
Vermilion, English, kgs . . lb.	1.50	1.64	1.45	1.69	1.60	1.90
Wattle Bark, bgs . . . ton	36.00	38.00	36.00	41.75	31.00	43.75
Extract, 60°, tks, bbls . . lb.	...	.04⅜	.04⅜	.04⅝	.03⅝	.04⅝
WAXES						
Wax, Bayberry, bgs . . . lb.	.16⅞	.17	.16⅞	.17	.16½	.17½
Bees, bleached, white 500 lb slabs, cases . . . lb.	.37	.39	.35	.45	.38	.45
Yellow, African, bgs . . lb.	.19	.20	.19	.26	.25	.30
Brazilian, bgs . . . . . lb.	.22	.23	.22	.29	.27	.34
Chilean, bgs . . . lb.	.22	.23	.22	.29	.27	.34
Refined, 500 lb slabs, cases lb.	.32½	.33	.32	.39	.29½	.39
Candelilla, bgs . . . lb.	.15¼	.15¾	.13½	.16	.13	.16½
Carnauba, No. 1, yellow, bgs . . . lb.	.39	.41	.38	.44	.42	.49
No. 2, yellow, bgs . . . . lb.	.38	.39	.36	.42	.41	.46½
No. 2, N. C., bgs . . . . . lb.	.34	.35	.34	.40	.38	.43
No. 3, Chalky, bgs . . . lb.	.29	.31	.29	.35½	.33	.40
No. 3, N. C., bgs . . . . . lb.	.30	.32	.30	.35½	.34	.43
Ceresin, dom, bgs . . . lb.	.08½	.11½	.08½	.11½	.08	.12
Japan, 224 lb cases . . . . . lb.	.09¾	.10	.09¼	.11	.09½	.11¼
Montan, crude, bgs . . . . . lb.	.11	.11¾	.11	.12⅛	.11	.12
Paraffin, see Paraffin Wax.						
Spermaceti, blocks, cases lb.	.22	.23	.22	.24	.23	.24
Cakes, cases . . . lb.	.23	.24	.23	.25	.24	.25
Whiting, chalk, com, 200 lb bgs c-l, wks . . . ton	12.00	14.00	12.00	14.00	12.00	14.00
Gilders, bgs, c-l, wks . . ton	...	15.00	...	15.00	...	15.00
Wood Flour, c-l, bgs . . . . ton	20.00	30.00	20.00	33.00	18.00	30.00
Xylol, frt allowed, East 10° tks, wks . . . gal.	...	.29	.29	.33	...	.33
Coml, tks, wks, frt all'd gal.	...	.26	.26	.30	...	.30
Xylidine, mixed crude, drs lb.	.35	.36	.35	.36	.35	.36
Zinc Acetate, tech, bbls, lcl, delv . . . lb.	...	.21	...	.21	...	...
Arsenate, bgs, frt all'd . . lb.	.12½	.13	.12½	.13½	...	...
Arsenite, bgs, frt all'd . . lb.	.12½	.13	.12½	.13	...	...
Carbonate tech, bbls, NY lb.	.14	.15	.14	.15	.12	.15
Chloride fused, 600 lb drs, wks . . . lb.	.04¼	.046	.04¼	.046	.04½	.046
Gran, 500 lb drs, wks lb.	.05	.05¾	.05	.05¾	.05	.05¾
Soln 50%, tks, wks 100 lb.	...	2.25	...	2.25	2.00	2.25
Cyanide, 100 lb drs . . . . . lb.	...	.33	.33	.38	.36	.38
Dust, 500 lb bbls, c-l, delv lb.	...	.06¾	.06	.0740	.0740	.094

* Dec. 23.

Prices—Current

Zinc Meta
Oil, Whal

	Current Market		1938 Low	1938 High	1937 Low	1937 High
Zinc (continued):						
Metal, high grade slabs, c-l,						
NY ....100 lb.	...	4.84	4.35	5.45	5.35	7.85
E. St. Louis 100 lb.	...	4.50	4.00	5.05	5.00	7.50
Oxide, Amer, bgs, wks . lb.	.06¼	.07½	.06	.07½	.05¼	.07¾
French 300 lb bbls, wks lb.	.06½	.07¾	.06¼	.07¾	.05½	.07¾
Palmitate, bbls ....lb.	.23	.25	.23	.25	.23	.25
Resinate, fused, pale, bbls lb.	...	.10	...	.10	.09	.10
Stearate, 50 lb bbls .....lb.	.20	.23	.20	.23	.20	.23
Zinc Sulfate, crys, 400 lb bbl,						
wks ....lb.	...	.029	.029	.033	.028	.033
Flake, bbls ....lb.	...	.0325	.0325	.0375	.032	.0375
Sulfide, 500 lb bbls, delv lb.	.08⅝	.08⅞	.08⅝	.09¾	.09¼	.09¾
bgs, delv ....lb.	.08⅜	.08⅝	.08⅜	.09	.09	.09½
Sulfocarbolate, 100 lb kgs						
..................lb.	.24	.26	.24	.26	.24	.26
Zirconium Oxide, crude, 73-75%						
grd, bbls, wks ....ton	75.00	100.00	75.00	100.00	...	...
kgs, wks ....lb.	.04¼	.04½	.04¼	.04½	...	...

Oils and Fats

	Current Market		1938 Low	1938 High	1937 Low	1937 High
Babassu, tks, futures .....lb.	...	.06½	.06⅛	.06¾	.06¾	.11¼
Castor, No. 3, 400 lb bbls . lb.	.09¼	.10	.09¼	.10¾	.10¼	.10¾
Blown, 400 lb bbls .....lb.	.11¼	.12	.11¼	.13	.12¼	.13
China Wood, drs, spot NY lb.	...	.15½	.10¼	.15½	.12½	.23
Tks, spot NY ....lb.	...	.15	.095	.15½	.118	.23
Coconut, edible, bbls NY . lb.	...	.08⅛	.08⅛	.09½	.09½	.15
Manila, tks, NY ....lb.	..	.03⅛	.03⅛	.04¼	.04	.09½
Tks, Pacific Coast ... lb.	.02⅝	.02¾	.02⅝	.03¾	.03¾	.08⅞
Cod, Newfoundland, 50 gal						
bbls ....gal.	.35	nom.	.35	.52	.51	.52
Copra, bgs, NY ....lb.	...	.0170	.0170	.0235	.0235	.055
Corn, crude, tks, mills ....lb.	.06½	.06⅝	.06⅜	.08¼	.06½	.10¾
Refd, 375 lb bbls, NY lb.	.09¼	.09¾	.09¼	.10½	.09	.13¼
Degras, American, 50 gal bbls,						
NY ....lb.	07¾	.08¼	.07½	.08¼	.07½	.08¼
English, bbls, NY ......lb.	.07¾	.08¼	.07½	.08¼	.07½	.08¼
Greases, Yellow ....lb.	.04⅞	.05	.03½	.05½	.04½	.09
White, choice bbls, NY . lb.	.05½	.05¾	.05	.07	.06¾	.10¼
Lard Oil, edible, prime ....lb.	...	.10¼	.10¼	.12¾	.12¾	.16¾
Extra, bbls ....lb.	...	.09	.08¾	.10¾	.10¾	.13½
Extra, No. 1, bbls ......lb.	...	.09	.08⅝	.09¾	.09¼	.13½
Linseed, Raw less than 5 bbl						
lots ....lb.	...	.095	.089	.115	.107	.121
bbls, c-l, spot ....lb.	...	.087	.081	.102	.099	.113
Tks ....lb.	...	.081	.07½	.096	.093	.107
Menhaden, tks, Baltimore gal.	.30	nom.	.34½	.37½	.34	.45
Refined, alkali, drs .....lb.	.077	.079	.067	.095	.08	.10
Tks ....lb.	..	.071	.061	.087	.074	.09
Kettle bodied, drs ......lb.	.086	.088	.076	.105	.09	.11
Light pressed, drs ......lb.	.071	.073	.061	.091	.074	.094
Tks ....lb.	..	.065	.05½	.08	.067	.084
Neatsfoot, CT, 20°, bbls, NY						
..................lb.	..	.15¼	.15¼	.17¼	.16¾	.18¼
Extra, bbls, NY ....lb.	...	.09	.08⅝	.10	.09½	.13¾
Pure, bbls, NY ....lb.	...	.10¾	.10¾	.12¼	.11¾	.14¼
Oiticica, bbls ....lb.	.11	.11½	.09¼	.12¾	.10⅞	.17
Oleo, No. 1, bbls, NY ....lb.	..	.08¾	.08½	.10½	.10½	.14½
No. 2, bbls, NY ....lb.	...	.08	.08	.10	.10	.14
Olive, denat, bbls, NY ...gal.	.93	.95	.86	1.20	1.15	1.65
Edible, bbls, NY ......gal.	1.75	2.00	1.75	2.35	2.20	2.50
Foots, bbls, NY ....lb.	.07⅛	.07¼	.07	.09⅞	.09⅝	.12½
Palm, Kernel, bulk ....lb.	..	.0340	.0325	.04½	.04½	.08⅛
Niger, cks ....lb.	.03⅝	.03¾	...	...	...	...
Sumatra, tks ....lb.	..	.02¾	.02⅝	.0375	.0375	.06½
Peanut, crude, bbls, NY . lb.	.07	.07¼	.07	.08¼	.06¼	.10⅝
Tks, f.o.b. mill ....lb.	.06⅝	.06¾	.06⅝	.08	.06½	.10¼
Refined, bbls, NY ......lb.	.10	.10⅜	.09¾	.10¾	.10	.13½
Perilla, drs, NY ....lb.	.09¾	.10	.09¾	.11¾	.11	.13½
Tks, Coast ....lb.	.0925	.094	.09	.11	.105	.13
Pine, see Pine Oil, Chemical Section.						
Rapeseed, blown, bbls, NY lb.	.14	.14½	.14	.14¾	.13	.14¾
Denatured, drs, NY ...gal.	.80	.82	.75	.91	.85	.97
Red, Distilled, bbls ....lb.	..	.07⅜	.07⅜	.10⅝	.09⅝	.12⅝
Tks ....lb.	...	.06½	.06½	.09¾	.08¾	.10¾
Sardine, Pac Coast, tks ..gal.		.31½	.28	.46½	.35	.55
Refined alkali, drs .....lb.	.077	.079	.067	.095	.08	.10
Tks ....lb.	.	.071	.061	.087	.074	.09
Light pressed, drs ......lb.	.071	.075	.061	.089	.074	.094
Tks ....lb.	...	.065	.05½	.08	.067	.084
Sesame, yellow, dom .....lb.	...	.10½	.10¼	.10½	.10¼	.13¼
White, dom ....lb.	...	.10½	.10¼	.10½	.10¼	.13¼
Soy Bean, crude						
Dom, tks, f.o.b. mills ...lb.	.05¾	.05⅞	.05⅞	.07	.06	.10½
Crude, drs, NY ...... lb.	.0635	.07	.06½	.08	.066	.11½
Ref'd, drs, NY ....lb.	.0755	.0825	.07⅝	.097	.078	.12½
Tks ....lb.	.0675	.0685	.0685	.082	.072	.11½
Sperm, 38° CT, bleached, bbls						
NY ....lb.	.10	.102	.10	.102	.096	.102
45° CT, bleached, bbls,						
NY ....lb.	.093	.095	.093	.095	.089	.095
Stearic Acid, double pressed						
dist bgs ....lb.	.10	.11	.10	.12	.11	.13½
Double pressed saponified						
bgs ....lb.	.10¼	.11¼	.10¼	.12¼	.11¼	.13¾
Triple pressed dist bgs . lb.	.13	.14	.13	.15	.14	.16½
Stearine, Oleo, bbls ...lb.	.06¾	.07	.05½	.08½	.07	.11½
Tallow City, extra loose ...lb.	..	.05⅜	.04¾	.06⅜	.05⅞	.09¼
Edible, tierces ....lb.	.06¾	nom.	.06	.07⅝	.06⅞	.10¼
Acidless, tks, NY ......lb.		.08	.07¾	.09¼	.09	.13
Turkey Red, single, bbls . lb.	.06¼	.08½	.06¼	.08½	.08	.08½
Double, bbls ....lb.	.09½	.11	.09½	.13	.12½	.13
Whale:						
Winter bleach, bbls, NY lb.	.081	.083	.081	.10	.091	.111
Refined, nat. bbls, NY . lb.	.077	.079	.077	.096	.087	.107

Index to Advertisers

"We"—Editorially Speaking

John D. Rue, author of the article on "Cellulose," page 28, was educated at Princeton, receiving his B.S. in 1906, and his A.M. in 1908. At Princeton he was assistant in chemistry from 1906-07; taught chemistry at Lawrenceville School, 1907-09; was a salesman from 1910-11; assistant professor chemistry, University of Oklahoma, 1911-13, and assistant professor chemical engineering, University of Michigan, 1913-17. While teaching here he became interested in the cellulose industries, especially pulp and paper. After service as captain in the Chemical Warfare Service during the war, he was in charge of research for the Management Engineering & Development Co. of Dayton, O. For the next six and one-half years he was in charge of the Pulp & Paper Section of the U. S. Forest Products Laboratories, at Madison, Wis. Later, successively, he was in charge of research for Champion Fibre Co., Canton, N. C., and engineer for the Newsprint Service Bureau, N. Y. City. Since 1931 he has been associated with the Hooker Electrochemical Co., concentrating on the application of chlorine and caustic soda to the purification and bleaching of cellulose. At present he is in charge of the Chlorine Sales Department of that company.

Some of our alphabetical agencies have come to have meanings quite far from the literal translation of their familiar initials. For instance, W. P. A. signifies to most of our citizens not "useful work during temporary employment," but shovel leaning with decaying morale, boondoggling with inefficient workmanship, subversive propaganda with some nasty political taints.

If F. D. R. is so keen for a reorganization of the Government, why doesn't he start at the top and install a little more "economy and efficiency" into the office of President of the United States?

As publishers we are intrigued by the knowledge that the first volume of "Panorama of New York," published by Random House, cost the P. W. A. $1,470,000, which is a greater sum than the retail sales of the six best sellers of the year past.

"Pride," says one of our wise-cracking executives to a group of his chemical peddlers, gathered together at the Chemists' Club for a holiday pep-up, "is a better reason for selling than fear." And back in the corner a hard-boiled voice whispered "How about prejudice?"

One of the more attractive receptionists up at Rockefeller Plaza—and the average attractiveness is very high—confided to us during Christmas week: "I am getting so thin you can count my ribs," and "We're" wondering whether it was a boast or an invitation.

It seems quite appropriate that the *Edinburgh Dispatch* should be credited with the wise-crack that it takes only "a little down" to feather the modern bride's nest.

Which reminds us that a well known Scotch sales manager of a well known chemical house has been busy denying that he has his bacon boiled in Lux to prevent it from shrinking.

Believe It or Not—

Total ton miles of freight moved in the period 1925-37 showed a net loss to the railways of 10 per cent.—waterways gained 4 per cent.; pipeline and trucks, 3 per cent. each.

The average motorist drives 8,400 miles, buys 683 gallons of gas, and 35 quarts of oil.

A new cement is formulated of finely divided copper, caustic magnesia, and magnesium chloride.

"We" doff our hat to George M. Bramann of Niacet Chemicals Corporation for his smartness in linking up the December "ad" of his company with the recently issued CHEMICAL INDUSTRIES Buyer's Guidebook Number. He headed his advertising layout "Niacet" Products-Specifications-Uses-Containers Completely Described in the Just Issued "Chemical Buyer's Guidebook Number," and then followed with a complete list of chemicals produced by Niacet.

It begins to look as if one more election and Mr. Roosevelt could make up a complete bureaucracy of "lame ducks."

Among the more unusual gifts that "We" received from Santa was a bottle of Scotch. What do you mean unusual? Well, it came from an advertising agency—which is a real "man-bites-dog" news item.

Somebody really ought to elect the platinum Miss Diane Rowland, well-known strip-tease artist of the Paint & Varnish, Insecticide, and Chemical Salesmen's Associations, an Honorary Member of the A. C. S.

At least they might appoint a committee to look over her qualifications.

Fifteen Years Ago

From our issues of January, 1924.

A. L. Loebenburg, formerly with Manufacturing Division, New York offices, National Aniline, goes to Buffalo to assume charge of company's plant there.

Perkin Medal awarded Frederick M. Becket at meeting of the Society of Chemical Industry.

Dr. L. H. Baekeland elected president, A. C. S., for 1924.

Corn Products Refining increases common stock from $5,000,000 to $75,000,000.

Dr. Charles A. Kraus, professor chemistry, Clark University, awarded Nichols Medal for current year for the best paper published in A. C. S. journals.

I. H. Taylor becomes director of sales, Michigan Alkali; George M. Dunning is in charge of the General Sales Department of the New York office.

Farleigh & Ball, New York brokers in chemicals and essential oils, open branch office in Chicago.

Barium Reduction Corp. leases its chlorine plant at South Charleston, W. Va., to Carbide & Carbon Chemicals Corp.

VOL. 44
Jan. '39

No. 1
Part 2

State of Chemical Trade

Current Statistics (Dec. 31, 1938)—p. 25

WEEKLY STATISTICS OF BUSINESS

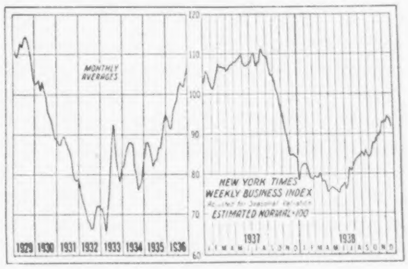
Week Ending	Carloadings 1938	Carloadings 1937	Carloadings % of Change	Electrical Output* 1938	Electrical Output* 1937	Electrical Output* % of Change	Jour. of Com. Price Index	Nat'l Fertilizer Ass'n Price Indices: Chem. & Drugs	Fats & Oils	Fert. Mat.	Mixed Fert.	All Groups	†Labor Dept. Chem. & Drug Price Index	% Steel Activity	N. Y. Times Index Bus. Act.	Fisher Commodity Index
Nov. 26	562,084	555,762	+ 1.1	2,183,807	2,065,378	+ 5.7	75.6	93.2	55.5	70.8	77.6	73.2	76.3	60.7	92.7	124.3
Dec. 3	649,086	620,325	+ 4.4	2,285,523	2,152,643	+ 6.2	75.4	93.2	56.1	71.0	77.6	73.3	76.3	59.9	93.1	124.4
Dec. 10	619,340	619,266	+ 0.01	2,318,550	2,196,105	+ 5.6	74.8	93.2	55.3	71.0	77.6	72.8	76.3	57.6	94.4	125.3
Dec. 17	606,314	600,283	+ 1.0	2,332,978	2,202,200	+ 5.9	74.7	93.2	54.9	71.3	78.0	72.5	76.3	51.7	93.7	125.3
Dec. 24	574,462	457,821	+25.1	2,362,947	2,085,186	+13.3	74.9	92.7	53.8	71.4	78.0	72.7	76.4	38.8	91.8	125.5
Dec. 31					1,998,135		75.4									124.5

MONTHLY STATISTICS

CHEMICAL:	November 1938	November 1937	October 1938	October 1937	September 1938	September 1937
Acid, sulfuric (expressed as 50° Baumé, short tons, Bureau of the Census)						
Total prod. by fert. mfrs.	....	....	161,285	212,258	133,266	188,252
Consumpt. in mfr. fert.	....	....	151,083	166,031	126,974	144,273
Stocks end of month	....	....	90,340	76,403	88,165	71,767
Alcohol, Industrial (Bureau Internal Revenue)						
Ethyl alcohol prod., proof gal..	15,163,681	18,179,322	17,016,879	18,786,249	15,799,687	17,219,398
Comp. denat. prod., wine gal...	2,827,108	4,127,663	3,723,506	7,849,380	2,619,783	4,806,615
Removed, wine gal.	2,989,361	4,266,405	3,985,430	8,272,344	2,569,815	4,648,767
Stocks end of mo., wine gal. ..	433,238	564,671	597,196	709,422	865,730	1,142,699
Spec. denat. prod., wine gal. ...	7,367,630	5,480,908	7,376,997	6,514,411	6,561,614	6,706,038
Removed, wine gal.	7,319,801	5,685,569	7,202,966	6,522,984	6,554,205	6,656,398
Stocks end of mo., wine gal...	799,477	555,036	767,078	765,030	600,591	778,597
Ammonia sulfate prod., tons *a*..	44,985	50,234	42,005	62,806	36,381	68,940
Benzol prod., gal. *b*	7,619,000	7,472,.000	7,100,000	9,610,000	6,056,000	10,765,000
Byproduct coke, prod., tons *a*..	3,277,523	3,222,300	3,092,806	4,035,100	2,675,089	4,426,375
Cellulose Plastic Products (Bureau of the Census)						
Nitrocellulose sheets, prod., lbs.	....	....	767,599	1,018,760	691,688	1,146,391
Sheets, ship., lbs.	....	....	804,556	1,109,000	722,699	1,239,549
Rods, prod., lbs.	....	....	203,996	174,950	207,256	242,412
Rods, ship., lbs.	....	....	252,909	258,351	233,921	365,340
Tubes, prod., lbs.	....	....	79,496	89,760	74,937	116,956
Tubes, ship., lbs.	....	....	66,470	102,257	73,702	87,017
Cellulose acetate, sheets, rods, tubes						
Production, lbs.	....	....	944,551	919,432	592,079	1,223,848
Shipments, lbs.	....	....	1,048,487	962,702	615,549	1,102,419
Methanol (Bureau of the Census)						
Production, crude, gals.	....	423,315	335,380	423,792	303,225	404,112
Production, synthetic, gals. ...	....	3,562,372	2,294,532	3,532,091	1,929,655	3,018,333
Pyroxylin-Coated Textiles (Bureau of the Census)						
Light goods, ship., linear yds...	....	....	2,539,528	2,788,158	2,426,910	2,956,369
Heavy goods, ship., linear yds...	....	....	1,943,776	1,828,913	1,910,165	2,005,416
Pyroxylin spreads, lbs. *c*......	....	....	4,902,740	4,944,517	4,957,411	5,481,218
Exports (Bureau of Foreign & Dom. Commerce)						
Chemicals and related prod. *d*..	....	....	$13,254	$12,893	$11,496	$11,268
Crude sulfur *d*	$600	$865	....	$1,831	$1,273	$1,050
Coal-tar chemicals *d*	$815	$991	$890	$1,073	$1,021	$1,214
Industrial chemicals *d*	$2,093	$2,226	$2,511	$2,568	$1,940	$2,060
Imports						
Chemicals and related prod. *d*..	....	....	$8,048	$8,506	$7,381	$7,339
Coal-tar chemicals *d*	$1,917	$1,229	$1,393	$1,948	$1,623	$1,605
Industrial chemicals *d*	$1,295	$2,033	$1,750	$1,745	$1,732	$1,620
Payrolls (U. S. Dept. of Labor, 3 year av., 1923-25 = 100)						
Chemicals and allied prod., including petroleum	119.2	129.9	120.1	135.1	118.9	136.6
Other than petroleum	114.7	126.3	116.2	132.5	114.1	134.2
Chemicals	128.4	142.8	128.3	151.8	121.4	152.2
Explosives	91.7	103.8	96.5	107.7	93.1	103.6
Employment (U. S. Dept. of Labor, 3 year av., 1923-25 = 100)						
Chemicals and allied prod., including petroleum	113.0	124.5	113.4	128.5	113.0	130.6
Other than petroleum	111.6	123.7	111.9	128.3	111.1	130.5
Chemicals	117.6	132.1	115.0	137.7	112.5	139.9
Explosives	82.8	90.1	84.1	91.8	84.9	92.2
Stocks of chemicals, etc. **						
Finished	....	....	z	....	z	....
Raw material	....	....	z	....	z	....
Price index chemicals	....	....	80.5	85.[illegible]	81.0	85.7
Chem. and drugs	....	....	77.1	81.2	77.3	81.4
Fert. mat.	....	....	67.5	72.5	67.2	71.8

FERTILIZER:	November 1938	November 1937	October 1938	October 1937	September 1938	September 1937
Exports (short tons, Nat. Fert. Association)						
Fertilizer and fert. materials...	....	....	134,929	178,73[illegible]	116,828	125,329
Ammonium sulfate	....	....	5,613	9,328	4,576	7,607
Total phosphate rock	....	....	67,078	121,567	78,233	82,682
Total potash fertilizers	....	....	18,061	2,925	4,189	10,239

INDUSTRIAL TRENDS



Business: While December showed some recession from the peak of fall activity, the decline did not assume more than the usual seasonal holiday and end-of-the-year dip. For the entire year of '38 trade volume and production dropped 15% from '37, according to the preliminary estimate of the Federal Reserve Bank of N. Y. Recovery in the last 7 months failed to erase the losses in the first 5 months of the year.

Steel: Holiday plant shut-downs and cautious year-end buying forced down the steel activity rate very sharply to 38.8%. A slight rebound was expected to about 45-50% with the turn of the year. Strong improvement, however, is not expected to be in evidence until late in January, when the automotive manufacturers are expected to come into the market in greater volume.

Automotive: December production estimated at 410,000 cars as against 346,886 in the same month of '37. January output is expected to be between 10-15% below the December total. The industry started 1939 at a rate of 20% above the '38 opening level. Total automotive production in '38 is estimated at 2,650,000 units. This compares with 5,016,565 in '37 and is almost equal to the '34 rate.

Retail Trade: After an extremely slow and discouraging start Christmas trade picked u near the end and for the country as a whole the decline from '37 was only about 2%. In most instances the number of sales was as great, but the unit sale was smaller and the average price lower.

Wholesale Trade: Stocks in the hands of retailers are at the lowest point for a long period. This has brought about a slight expansion al-

State of Chemical Trade

Current Statistics (Dec. 31, 1938)—p. 26

ready and is expected to be felt more generally over the next 60 days.

Employment: November job rise is reported at 30,000; since June approximately one million have been re-employed. The increase in November was contrary to the usual seasonal trend and was chiefly due to heavy re-employment in retail and wholesale trade, mining, etc.

Textiles: All lines continue active. A last minute spurt in cotton cloth buying makes it somewhat doubtful that there will be as great a let-down in manufacturing as was earlier expected. Rayon sales for '38 were better than in '37. Although '38 consumption of raw silk showed a decline from '37, an increase of 40% in mill takings in December over the like month the year previous was reported.

Glass: Manufacturing activity continues at an encouraging rate and industry leaders seem agreed that '39 will see further expansion.

Carloadings: Weekly figures now are showing substantial gains over the corresponding weeks of the previous year.

Electrical Output: Electric power production set a new all-time high record for the week ended Dec. 24. Due to the severe industrial curtailment in the first part of '38, the total output was 5% less than for the previous year.

Commodity Prices: Movement was mixed last month, but in nearly all cases whether up or down the net change was small.

Chemicals: December volume was below the October-November level, but was considerably higher than in the corresponding month of '37.

Outlook: The new year certainly opens on a more optimistic note than did the year previous. The index of production of the Federal Reserve Board shows today that it has recovered between 60 and 65% of its extreme loss which it sustained in the last recession. A year ago the stock market was extremely bearish, commodity prices were in the midst of one of their most precipitous declines in history, sentiment generally was at a low ebb. The stock market in the past several months has staged a recovery, commodity prices have risen, nearly all the indices, employment, payrolls, carloadings, etc., testify to a pronounced upward movement. General consensus of opinion seems to point to the feeling that the first 6 months of '39 will be satisfactory—beyond that very few care to hazard a guess. The international and the domestic political situations have shown very little if any degree of betterment, and they are definitely uncertainties that make long-term prognostications pretty futile.

MONTHLY STATISTICS (cont'd)

FERTILIZER: (Contd)	November 1938	November 1937	October 1938	October 1937	September 1938	September 1937
Imports (short tons, Nat. Fert. Association)						
Fertilizer and fert. materials	....	....	156,034	152,919	128,389	158,753
Ammonium sulfate	....	....	5,605	2,746	21,440	4,752
Sodium nitrate	....	....	32,971	2,871	20,829	6,132
Total potash fertilizer	....	....	64,124	93,961	42,407	98,194
Superphosphate e (Nat. Fert. Association)						
Production, bulk	287,123	324,514	259,305	333,553	229,961	303,030
Shipments, total	133,803	179,112	213,161	227,368	334,084	385,943
Northern area	66,239	96,182	122,569	132,543	261,181	304,692
Southern area	67,564	82,930	90,592	94,825	72,903	81,251
Stocks, end of month, total	1,595,469	1,607,475	......	1,416,941	1,295,213	1,275,151
Tag Sales (short tons, Nat. Fert. Association)						
Total, 17 states	146,872	123,466	131,199	146,913	223,972	225,975
Total, 12 southern	146,145	122,889	121,480	126,587	137,337	135,018
Total, 5 midwest	727	577	9,719	20,326	86,635	90,957
Fertilizer payrolls	64.7	76.5	70.1	82.2	77.4	96.0
Fertilizer employment	79.0	83.6	79.5	89.4	82.1	93.9
Value imports, fert. and mat. *d*	$2,805	$3,633	....	$3,689	$3,427	$3,311
GENERAL:						
Acceptances outst'd'g *f*	$273	$348	$269	$346	$261	$344
Coal prod., anthracite, tons	3,167,348	3,694,322	3,518,678	4,320,074	3,337,000	3,229,162
Coal prod., bituminous, tons	35,480,000	36,428,000	34,900,000	40,833,000	32,276,000	59,177,000
Com. paper outst'd'g *f*	$206	$311	$213	$323	$212	$331
Failures, Dun & Bradstreet	984	842	997	815	866	584
Factory payrolls *i*	....	....	83.7	104.5	81.0	104.4
Factory employment *i*	....	....	89.5	107.2	88.8	109.0
Merchandise imports *i*	$176,181	$223,090	$177,979	$224,299	$167,651	$233,142
Merchandise exports *i*	$252,231	$314,697	$277,928	$332,910	$246,361	$296,579
GENERAL MANUFACTURING:						
Automotive production	372,359	360,055	209,522	329,876	83,534	171,213
Boot and shoe prod., pairs	....	....	34,616,562	29,691,637	38,145,451	34,032,089
Bldg. contracts, Dodge *j*	$301,679	$198,464	$357,698	$202,081	$300,900	$207,072
Newsprint prod., U. S. tons	....	....	72,827	78,352	68,315	77,847
Newsprint prod., Canada, tons.	....	....	254,872	314,594	231,940	312,220
Plate glass prod., sq. ft.	12,883,448	12,517,311	12,868,717	14,854,918	8,873,344	16,479,144
Steel ingot prod., tons	3,572,220	2,154,365	3,117,934	3,392,924	2,657,748	4,289,507
% steel capacity	62.5	38,23	52.45	58.31	46.28	76.30
Pig iron prod., tons	2,269,983	2,006,724	2,052,284	2,892,629	1,680,435	3,410,371
U. S. consumpt. crude rub., tons	46,048	34,025	40,333	38,754	37,823	43,893
Tire shipments	4,442,296	3,776,775	4,143,616	....	3,943,486	....
Tire production	4,117,457	3,119,585	4,134,319	....	3,970,397	....
Tire inventories	7,924,114	10,963,469	8,237,338	....	8,406,261	....
Cotton consumpt., bales	596,289	482,976	542,778	524,188	534,037	601,305
Cotton spindles oper.	22,449,280	22,778,818	22,113,952	23,714,646	22,188,018	23,888,686
Silk deliveries, bales	41,599	31,749	35,631	36,002	38,844	36,372
Rayon deliv., lbs.	21,000,000	9,400,000	24,500,000	....	....	....
Rayon employment *i*	312.6	349.2	314.4	361.8	315.2	380.1
Rayon payrolls *i*	302.8	337.9	302.6	351.6	308.2	369.1
Soap employment *i*	88.9	92.6	93.2	94.6	92.6	94.9
Soap payrolls *i*	88.3	93.4	94.8	96.6	94.6	97.5
Paper and pulp employment *i*.	105.8	110.9	104.8	104.0	114.5	116.2
Paper and pulp payrolls *i*	103.2	103.8	106.5	115.0	101.6	115.8
Leather employment	84.0	81.1	81.2	87.6	78.3	90.5
Leather payrolls *i*	84.7	75.2	81.7	86.3	78.5	89.6
Glass employment *i*	91.5	106.5	87.5	109.7	82.1	110.9
Glass payrolls *i*	98.3	112.7	92.9	120.1	82.6	119.6
Rubber prod. employment *i*	82.6	90.5	77.7	97.1	75.9	97.5
Rubber prod. payrolls *i*	85.5	82.2	79.7	94.5	76.7	97.6
Dyeing and fin. employment *i*.	109.2	108.9	105.9	112.3	104.1	110.6
Dyeing and fin. payrolls *i*	92.5	89.1	92.0	94.6	89.7	95.0
MISCELLANEOUS:						
Oils & Fats Index ('26 = 100)	57.9	67.1	58.6	70.1	59.5	74.5
Gasoline prod., bbls.	....	....	49,489	50,744	46,872	49,523
Cottonseed oil consumpt., bbls.	263,024	427,605	281,028	487,837	261,879	408,217
PAINT, VARNISH, LACQUER, FILLERS:						
Sales 680 establishments	....	....	$30,007,078	$32,791,845	$31,046,584	$34,489,882
Trade sales (580 establishments)	....	....	$16,128,067	$16,256,222	$17,431,211	$18,536,147
Industrial sales, total	....	....	$10,985,822	$13,447,493	$10,492,087	$14,009,835
Paint & Varnish employ. *i*	112.3	123.8	112.9	....	....	....
Paint & Varnish, payrolls *i*	113.6	122.1	116.3	....	....	....

a Bureau of Mines; *b* Crude and refined plus motor benzol, Bureau of Mines; *c* Based on 1 lb. of gun cotton to 7 lbs. of solvent, making an 8-lb. jelly; *d* 000 omitted, Bureau of Foreign & Domestic Commerce; *e* Expressed in equivalent tons of 16% A.P.A.; *f* 000,000 omitted at end of month; *i* U. S. Dept. of Labor, 3 year average, 1923-25 = 100; *j* 000 omitted, 37 states; *p* Rayon Organon, formerly an index was given, now the exact poundage is given; *q* 680 establishments, Bureau of the Census; *r* Classified sales, 580 establishments, Bureau of the Census; *s* 53 manufacturers, Bureau of the Census; *v* In thousands of bbls., Bureau of the Census; ** Indices, Survey of Current Business, U. S. Dept. of Commerce; *z* Temporarily not available.

Company Reports

Columbian Carbon and its subsidiaries reported for the 9 months ended on Sept. 30 a net profit of $1,944,459, including $3,726 profit on sales of securities and after deductions for Federal income taxes, depreciation, depletion and minority interests.

The result was equivalent to $3.62 each on 537,406 shares of no-par capital stock, excluding 1,014 shares in the treasury. It compared with a net profit in the first 9 months of 1937 of $3,386,067, including $263,408 profit on the sale of securities. This net was equal to $6.85 a share of capital stock.

Consolidated net income of Freeport Sulphur for the quarter ended Sept. 30, 1938, amounted to $393,505, equivalent to 50c a share on the common stock, Langbourne M. Williams, Jr., president of the company, announced recently. Of these earnings 10c per share represented the company's proportion of the net income of the Cuban-American Manganese Corp.

Net income as above reported is after all charges, including depreciation, depletion and Federal taxes, and compares with net income of $699,518, or 85c a share, in the corresponding quarter of 1937.

As of Sept. 30, 1938, current assets amounted to $8,561,656, of which $2,066,300 was cash, and current liabilities amounted to $1,459,264. On the same date last year current assets amounted to $10,737,309, of which $4,390,774 was cash, and current liabilities amounted to $2,166,050.

Glidden—$205,597

Report of Glidden Co. and consolidated subsidiaries for fiscal year ended Oct. 31, 1938, certified by independent auditors, shows net profit of $205,597 after interest, depreciation, depletion, federal income taxes, etc., equivalent to $1.03 a share (par $50) on 199,940 shares of 4½% cumulative convertible preferred stock outstanding.

This compares with net profit of $2,542,793, equal to $2.62 a share on 799,701 no-par common shares in preceding year, after dividend requirements on 4½% preferred stock.

Above net profit figures are exclusive of $48,108 loss of wholly-owned non-operating California mining companies in the 1938 year and similar loss of $44,793 in preceding year.

For 6 months ended October 31, 1938, net profit was $193,026, equal to 96c a share on 4½% preferred stock, comparing with net profit of $859,539 or 79c a common share in 6 months ended Oct. 31, 1937.

Pays Only Regular

Directors of Air Reduction on Dec. 14 declared the regular quarterly dividend of 25c on common, payable Jan. 15 to stock of record Dec. 31. On Jan. 15, 1938, company disbursed an extra of 25c in addition to the regular 25c payment.

Approve Merger

Dow Chemical and Great Western Electro-Chemical stockholders at their respective meetings Dec. 22 approved proposed merger of the two companies. Merger plan provides that each share of the Great Western Electro-Chemical Co.'s 6 per cent. preferred stock will receive 3/16 of a share of the common stock of Dow, and the Great Western common stock will be exchanged for the Dow company's common stock on a share-for-share basis.

Price Trend of Representative Chemical Company Stocks

	Nov. 30	Dec. 3	Dec. 10	Dec. 17	Dec. 24	Dec. 31	Net gain or loss last mo.	Price on Dec. 31, 1938	1938 High	1938 Low
Air Reduction	63	61¼	62¾	64½	65	65⅞	+2⅞	49½	67⅞	40
Allied Chemical	186⅛	182¼	182	185	185	193	+6⅞	162½	197	124
Am. Cyan'd "B"	26	25⅞	26	26⅜	27¼	28	+2	22⅞	30¼	15½
Am. Agric. Chem.	23⅝*n	23½n	23½	22⅛n	22¼n	23n	—⅝	58	28½	22
Columbian Carbon	95¼	96½	96	95¼	90	91	—4¼	67	98½	53¾
Com'l Solvents	10¼	10	9¼	9¼	9⅜	11⅛	+⅞	7⅜	12¼	5⅞
Dow Chemical	135⅛	133	134	137½	133¾	132⅞	—2¼	91	141	87⅞
du Pont	146	137½	146½	150	150½	154½	+8½	112	154¾	90½
Hercules Powder	73	71⅝	75	83	83	86	+13	52	87	42¾
Mathieson Alkali	34	34⅛	33¼	35¼	35⅞	35¾	+1¾	22¾	36⅞	19¾
Monsanto Chemical	102	104¼	104¼	106½	105¾	110	+8	84	110	67
Std. of N. J.	51½	50¼	50¼	51½	52	53⅛	+1⅝	45¼	58⅜	39¾
Tex. Gulf Sulp.	32⅝	32½	31¼	31½	31	32⅜	—¼	27¼	38	26
Union Carbide	84½	84⅛	86¾	87⅝	89	89⅝	+5⅛	73½	90⅞	57
U. S. Ind. Alco.	27½	26	25	24⅛	23	24¼	—3¼	21	30¼	13½

Earnings Statements Summarized

Company:	Annual dividends	Net income 1938	Net income 1937	Common share earnings 1938	Common share earnings 1937	Surplus after dividends 1938	Surplus after dividends 1937
American Commercial Alcohol							
Nine months, Sept. 30	y$.50	$80,437	$697,995	$.01	$2.53	......	......
Champion Paper & Fibre							
Twelve weeks, Nov. 6	y.25	162,848	481,075	.10	.69	......	......
Twenty-eight wks., Nov. 6	y.25	10,946	1,403,562	p.15	2.10	......	......
Celotex Corp.							
Year, October 31	x ..	518,358	1,266,753	h1.19	h4.17	......	......
Dow Chemical							
Four months, Sept. 30	y3.00	1,054,422	......	1.01	...	......	......
Glidden							
Six months, Oct. 31	f ..	193,026	859,539	p.96	.79	......	......
Year, Oct. 31	f ..	205,597	2,542,793	p1.03	2.62	d$644,187	$12,747
Illinois Zinc							
Year, Sept. 30	f ..	†292,348	111,428	...	1.17	......	......
United Wall Paper Factories							
Two months, Aug. 31	y.10	†154,293	*......	...	...	......	......

y: Amount paid or payable on 12 months to and including the payable date of the most recent dividend announcement; p: On preferred stock; x: 100% stock dividend on common paid in last 12 months; h: On shares outstanding at close of respective periods; f: No common dividend; d: Deficit; † Net loss.

Dividends and Dates

Name	Div.	Stock Record	Payable
Abbott Labs., stk. ext.	5%	Dec. 12	Jan. 25
Abbott Labs., 4½% pf., q.	$1.12½	Jan. 3	Jan. 15
Air Reduction, q.	25c	Dec. 31	Jan. 16
Amer. Cyan. A & B q.	15c	Dec. 15	Jan. 3
Amer. Cyan., pf., q.	12½c	Dec. 15	Jan. 3
Celanese Corp. of Am. 7% pr. pf., q.	$1.75	Dec. 16	Jan. 1
Celanese Corp. of Am. 7% pt. pf.	$5.00	Dec. 16	Dec. 31
Chemical Fund, Inc.	8c	Dec. 31	Jan. 1
Colgate-Palm-Peet pf., q.	$1.50	Dec. 6	Jan. 1
Corn Prod. Ref., q.	75c	Jan. 3	Jan. 20
Corn Prod. Ref., pf., q.	$1.75	Jan. 3	Jan. 16
Devoe & Raynolds A and B	passed Dec. 7, 1938		
Devoe & Raynolds, pf., q.	$1.75	Dec. 20	Jan. 3
Dominion Tar & Chem. pf., q.	$1.37½	Jan. 16	Feb. 1
du Pont, pf., q.	$1.12½	Jan. 10	Jan. 25
du Pont, deb., q.	$1.50	Jan. 10	Jan. 25
Eagle-Picher Lead, pf., q.	$1.50	Dec. 15	Jan. 2
Glidden Co., pf., q.	56¼c	Dec. 16	Jan. 3
Hercules Powder, pf., q.	$1.50	Feb. 3	Feb. 15
International Nickel	50c	Dec. 2	Dec. 31
International Nickel pf., q.	$1.75	Jan. 3	Feb. 1
Koppers Co., 6% pf.	75c	Dec. 14	Jan. 1
Liquid Carbonic, q.	20c	Dec. 20	Jan. 3
MacAndrews & Forbes	50c	Dec. 31	Jan. 14
MacAndrews & Forbes, pf., q.	$1.50	Dec. 31	Jan. 14
Merck & Co., $6 pf., q.	$1.50	Dec. 20	Jan. 1
Monroe Chemical Co., pf., q.	87½c	Dec. 15	Jan. 2
Monsanto Chem. Co., pf., s	$2.25	May 10	June 1
Nat. Lead, pf. B, q.	$1.50	Jan. 20	Feb. 1
Paraffine Cos., pf. q.	$1.00	Jan. 3	Jan. 16
Parke Davis	40c	Dec. 23	Jan. 3
Parker Rust-Proof, q.	25c	Feb. 10	Mar. 1
Sherwin-Williams, 7% pf., ac.	$1.75	Dec. 15	Jan. 3
Staley Mfg. Co., 7% pf., s.	$3.50	Dec. 20	Jan. 1
Union Carbide	40c	Dec. 2	Jan. 2
United Dyewood, pf., q.	$1.75	Dec. 9	Jan. 3
Young, J. S. & Co., q.	$1.50	Dec. 23	Jan. 3
Young, J. S. & Co., pf., q.	1.75	Dec. 23	Jan. 3

ac—accumulations; s—semi-annual.

Chemical Finances

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Chemical Stocks and Bonds

PRICE RANGE December 1938 Last	December 1938 High	December 1938 Low	1937 High	1937 Low	1936 High	1936 Low	Sales: Number of shares December 1938	Sales: 1938	Stocks	Par $	Shares Listed	Dividends*	Earnings** $-per-share-$ 1937	1936	1935
NEW YORK STOCK EXCHANGE															
57⅞	61	46¼	55	46	...	...	4,500	35,300	Abbott Labs.	No	640,000	$2.10	2.51	2.21	1.77
65⅞	67⅞	40	80¼	44½	86½	58	35,000	372,500	Air Reduction	No	2,566,191	3.00	2.86	2.79	2.05
193	197	124	258½	145	345	157	24,600	187,500	Allied Chem & Dye	No	2,214,099	7.50	11.19	11.44	8.71
23	28½	22	33¾	17⅞	29⅝	16⅜	4,900	50,500	Amer. Agric. Chem	No	627,987	2.58	2.95	1.57	2.12
10¾	15	9	30¾	8¼	35⅜	20½	20,200	147,100	Amer. Com. Alcohol	No	260,930	.50	3.23	4.55	3.16
29½	31½	20	46	22	50	37	4,400	31,100	Archer-Dan.-Midland	No	549,546	2.00	5.03	3.05	4.20
66⅝	68	36	94	38	84	48	6,500	30,800	Atlas Powder Co.	No	248,145	2.25	4.40	4.21	2.81
125¼	126¼	105	133	101	131	112	110	2,320	5% conv. cum. pfd.	100	68,597	5.00	20.90	20.85	16.93
23⅝	26⅝	9	41¼	13	32¼	21¾	50,200	839,500	Celanese Corp. Amer.	No	1,000,000	2.25	2.04	2.33	1.99
90	96	82	115	90	116	106	1,600	6,400	prior pfd.	100	164,818	7.00	27.07	27.25	35.34
14½	17	7⅛	25¾	8½	21¼	13	41,700	513,600	Colgate-Palm.-Peet	No	1,999,970	.50	—.35	1.40	1.36
102¼	104¼	78	104½	95	106½	100	2,500	22,100	6% pfd.	100	248,197	6.00	3.21	17.13	16.79
91	98½	53¾	125¾	65	136½	94	3,000	51,700	Columbian Carbon	No	537,406	6.50	8.31	7.48	5.56
11⅛	12¼	5⅞	21¼	5	24⅝	14¼	108,200	937,600	Commercial Solvents	No	2,636,878	.60	.60	.85	1.02
66½	70¾	53	71¼	50½	82½	63⅝	23,700	213,100	Corn Products	25	2,530,000	3.00	2.52	3.86	2.62
177	177	162	171½	153	170	158	500	6,200	7% cum. pfd.	100	245,738	7.00	32,96	46.76	33.97
30⅞	40⅞	25	76⅛	29½	63	42	7,890	35,260	Devoe & Rayn. A.	No	95,000	3.25	4.05	4.49	2.89
132⅞	141	87⅞	159¼	79½	142¼	94⅛	13,700	89,100	Dow Chemical	No	945,000	3.35	4.17	4.48	3.29
154½	154¾	90½	180⅛	98	184¾	133	66,000	826,000	DuPont de Nemours	20	11,041,437	6.25	7.37	7.54	5.04
120	120½	109½	112	107½		...	4,400	32,300	4½% pfd.	No	500.000	4.50	165.48	.....	.....
138	138½	130¾	135½	130	136½	129	3,900	24,700	6% cum. deb.	100	1,092,948	6.00	81.70	84.21	56.81
184¾	187	121½	198	144	185	156	15,500	168,300	Eastman Kodak	No	2,250,921	7.50	9.76	8.23	6.90
173	173	157	164	150	166	152	560	3,560	6% cum.	100	61,657	6.00	362.45	306.64	258.09
30	32	19⅞	32¼	18	35⅝	23½	14,900	270,300	Freeport Texas	10	796,380	1.50	3.30	2.43	1.78
10⅝	12⅛	6¾	19	8½	18	9½	5,600	103,800	Gen. Printing Ink	1	735,960	1.20	1.32	1.32	.97
24	28½	13	51½	19⅛	55¼	39½	22,500	241.600	Glidden Co.	No	799,701	2.60	2.62	3.29	2.74
47⅛	51½	37	58⅛	43	56	52¼	800	8,100	4½% cum. pfd.	50	199,940	2.25	12.72	15.43	13.23
107⅜	111	76¾	117½	80⅛	133	99⅝	2,900	16,400	Hazel Atlas	25	434,474	6.56	6.67	6.55	7.58
86	87	42¾	92½	50	75	42	29,600	148,300	Hercules Powder	No	1,316,710	2.62	2.97	3.24	2.12
133	135¼	126¾	135½	125	135	126	680	4,500	6% cum. pfd.	100	96,194	6.00	50.75	48.97	36.30
24¾	30⅜	14⅜	47½	15	41⅜	25⅝	18,000	221.900	Industrial Rayon	No	759,325	2.00	.34	2.24	1.00
28	34½	15	64¼	20	48	37	7,500	83,700	Interchem.	No	289,058	2.00	1.44	3.02	2.21
91¾	98	80	111½	92	112	107	760	5,450	6% pfd.	100	66,917	6.00	12.26	18.97	16.15
2½	3⅞	2	9⅛	2	5⅞	2⅞	8,400	112,000	Intern. Agricul.	No	438,048	....	.16	—1.55	—.99
23⅞	29	15	63½	18¼	47¼	22¾	1,400	31,600	7% cum. pfd.	100	100,000	3.00	7.70	.23	2.69
56⅛	57⅝	36⅞	73⅜	37	66⅜	43¼	183,000	2,725,000	Intern. Nickel	No	14,584,025	2.25	3.31	2.40	1.65
30	30¼	19½	28¾	19½	30	23	1,900	18,000	Intern. Salt	No	240,000	1.75	2.17	1.70	1.32
20¾	24	19⅛	36	19¼	36¾	29¼	2,300	13,900	Kellogg (Spencer)	No	500,000	1.60	2.81	2.62	2.22
54⅜	58⅜	23¼	79	33⅝	80¼	47¼	38,200	454.100	Libbey Owens Ford	No	2,506,117	4.00	4.19	4.14	3.26
18¾	21½	12⅛	26⅞	14	46½	32½	11,900	131,400	Liquid Carbonic	No	700,000	2.75	2.37	1.58	1.29
35¾	36⅞	19¾	41¾	22	42⅜	27½	11,800	100,000	Mathieson Alkali	No	828,191	1.65	1.81	1.76	1.44
110	110	67	107½	71	103	79	25,100	218,700	Monsanto Chem.	No	1,114,338	3.00	4.40	4.01	3.45
115¾	117½	111	109	105	...	...	1,620	5,310	4½% pfds. (A & B)	No	100,000	4.50	49.99	.....	.....
27⅛	31	17⅛	44	18	36½	26¾	54,600	676,300	National Lead	10	3,098,310	.50	.95	1.71	1.08
168	178½	154	171	153	171	155	900	5,600	7% cum, "A" pfd.	100	243,676	7.00	22.86	33.83	25.40
137¾	145½	127	150	127	147	137¾	950	5,280	6% cum. "B" pfd.	100	103.277	6.00	43.77	74.50	49.05
16¾	19½	9⅞	41¾	10⅛	40	9	50,500	945.900	Newport Industries	1	519,347	.50	2.22	.99	.57
70⅞	76¼	40	103¾	51¼	82	64	39,900	337.200	Owens-Illinois Glass	12.50	2,661,204	4.00	3.51	3.80	2.09
56⅛	59	39½	65½	43¼	56	40¼	24,800	228,000	Procter & Gamble	No	6,325,087	2.75	4.08	2.39	2.23
117½	122¼	114	118½	114½	122½	115¾	2,030	13,090	5% pfd.	100	169,517	5.00	157.05	94.14	88.15
15⅛	18⅜	10	34¾	14⅞	28¼	14¾	30,100	279,100	Shell Union Oil	No	13,070,625	1.00	1.44	1.35	.37
105	106½	93	105⅜	91	127½	102	2,500	27,200	5½% cum. pfd.	100	379,798	5.00	60.59	57.20	17.92
28¼	34¾	18½	60⅝	26½	47⅜	19⅛	18,500	210,900	Skelly Oil	No	1,006,348	1.50	6.07	4.42	2.17
95	98	84	102¼	88	132	97⅝	2,300	8,800	6% cum. pfd.	100	66,300	6.00	97.86	73.16	39.00
28⅜	35½	24¾	50	26½	48½	32¾	132,900	690.000	S. O. Indiana	25	15.235,323	2.30	3.06	3.09	1.98
53⅛	58⅜	39¾	76	42	70⅜	51⅛	157,200	1,380,200	S. O. New Jersey	25	26,224,767	2.50	5.64	3.73	2.39
6¼	8	3⅞	15⅜	5¼	13	5⅝	117,000	160,200	Tenn. Corp.	5	853,696	.35	1.09	.41	.22
48	49⅝	37⅝	65⅛	34¾	55¼	28⅞	167,400	1,518,000	Texas Corp.	25	11,386,253	2.25	5.02	4.10	1.57
32⅜	38	26	44	23¾	44¾	33	34,900	285,200	Texas Gulf Sulphur	No	3,840,000	2.75	3.02	2.57	1.04
89⅝	90⅞	57	111	61¼	105¼	71⅝	99,000	991,900	Union Carbide & Carbon	No	9,000,743	3.20	4.75	4.09	3.06
65½	73½	39	91	36¾	96¾	68	10.500	92,500	United Carbon	No	397,885	4.50	5.30	5.54	4.71
24¼	30¼	13½	43⅝	16⅛	59	31¼	12,000	180,900	U. S. Indus. Alcohol	No	391,238	..	1.24	—.20	2.16
27⅞	28⅞	11½	39⅜	9¼	30⅝	16¼	32,000	430,900	Vanadium Corp. Amer.	No	376,637	1.00	2.22	.40	—1.13
25¼	25¼	13½	...	...	...	...	20.000	49,000	Victor Chem.	5	696,000	1.12	1.01	1.16	1.13
4	5⅝	2¾	12¾	2⅛	8½	4⅛	10,400	183,700	Virginia-Caro. Chem.	No	486.708		—.05	—2.44	—.79
28	32⅛	15¾	74⅜	18½	58¼	28¾	7,900	142,500	6% cum. part. pfd.	100	213,392	1.50	5.88	.44	4.20
20	20⅛	10	27¼	10¾	32	19¾	4,300	37,000	Westvaco Chlorine	No	339,362	1.00	1.46	1.17	1.37
31½	31½	20	34⅞	21⅛	35¼	31¾	3,300	24,400	cum. pfd.	30	192,000	1.50	4.09	3.26	3.22
NEW YORK CURB EXCHANGE															
28	30¼	15½	37	17⅝	40¾	29¼	39,000	494,400	Amer. Cyanamid "B"	10	2,520,368	.60	2.09	1.77	1.61
90	92	50	124	69	116¼	99¼	1,275	6,650	Celanese, 7% cum. 1st pfd.	100	148,179	7.00	22.32	24.47	21.96
3⅞	6¾	3	15	3	16½	9	1,100	12,900	Celluloid Corp.	15	194,952		—.92	—.80	—.95
6½	12	6½	14⅝	10½	15	11⅞	400	1,700	Courtauld's Ltd.	£1	24,000,000	9½%	8.64%	8.30%	7.51%
7	9⅞	6	10⅝	3½	10¾	5	2,300	22,700	Duval Texas Sulphur	No	500,000	....	.43	.61	.16
40	41¼	27	47½	31	55	39	700	7,500	Heyden Chem. Corp.	100	150,000	2.50	3.94	3.56	3.22
107½	115½	55	147½	77	140	98¼	11,400	113,100	Pittsburgh Plate Glass	25	2,142,443	6.50	8.53	7.15	5.32
111	117¾	66	154¾	72¼	154½	117	8,970	78,750	Sherwin Williams	25	633,927	6.00	8.44	8.04	6.19
114	114⅛	107	114	106¼	116	110	140	2,720	5% cum. pfd.	50	137,139	5.00	44.01	41.44	33.17
PHILADELPHIA STOCK EXCHANGE															
167	167	121½	179	115	179	114¾	575	5,100	Pennsylvania Salt	50	150,000	8.75	11.79	8.57	5.94

PRICE RANGE December 1938 Last	December 1938 High	December 1938 Low	1937 High	1937 Low	1936 High	1936 Low	Sales December 1938	Sales 1938	Bonds	Date Due	Int. %	Int. Priod	Out standing $
NEW YORK STOCK EXCHANGE													
101⅜	105⅜	99⅛	109½	99	117½	107¾	502,000	3,640,000	Amer. I. G. Chem. Conv.	1949	5½	M-N	$25,300,000
25½	38	25⅛	42½	23	42½	27½	161,000	1,941,000	Anglo Chilean Nitrate inc. deb.	1967	4½-5	J	12,067,000
106	106⅛	102⅜	102⅞	100⅛	...	...	16,000	510,000	Dow Chemical	1951	3	J-D	5,000,000
102	102¾	100	102	98½	102¾	96¾	6,000	223,000	Int. Agric. Corp. 1st Coll. tr. stpd. to 1942	1942	5	M-N	5,633,000
25¼	35⅜	24¾	35⅜	21¼	39	21	327,000	2,708,000	Lautaro Nitrate n inc. deb.	1975	4	J-D	30,500,000
35	35⅜	24¾	25½	20½	35	23½		41,000	Ruhr Chem.	1948	6	A-D	1,500,000
104⅝	105	96½	102	93	101¼	94¾	185,000	4,918,000	Shell Union Oil	1951	3½	M-S	58,800,000
103⅝	104⅜	90¼	102¾	94	102⅞	96⅝	99,000	2,136,000	Skelly Oil	1951	4	J-J	9,000,000
102¼	103	95	105	93½	105	103	25,000	237,000	Tenn. Corp. deb. "B"	1944	6	M-S	1,600,000
107¼	107⅜	103½	105¾	100	106	101½	392,000	4,111,000	Texas Corp.	1951	3½	J-D	60,000,000
99	101	77	111	81	98½	85¾	72,000	623,000	Vanadium Corp. conv.	1941	5	A-O	2,800,000

* Paid in 1937, including extras but excluding dividends paid in stock. ** For either fiscal or calendar years.

Biennial Census of Manufactures

Preliminary Figures for 1937—p. 1

CENSUS OF MANUFACTURES, 1937

Summary By Industries (Groups of Special Interest to the Chemical and Allied Fields Only)

Industry	No. of establishments	No. of salaried employees	Wage earners (average for the year)	Salaries	Wages	Cost of materials, fuel, electric energy, and contract work	Value of products	Value added by manufacture
Chemicals not elsewhere classified	601	16,869	78,951	$43,592,509	$117,221,112	$455,061,975	$932,749,910	$477,687,935
Artificial leather	25	404	2,541	1,147,413	3,475,034	18,413,414	27,607,448	9,194,034
Baking powder, yeast, and other leavening compounds	40	541	2,380	1,411,684	3,761,069	13,330,155	30,279,373	16,949,218
Blacking, stains, and dressings	147	682	1,536	1,650,754	1,479,735	7,988,251	19,182,557	11,194,306
Bluing	14	25	67	82,910	69,129	350,368	1,128,529	778,161
Bone black, carbon black, and lampblack	62	206	2,190	552,560	2,711,599	7,235,671	18,853,576	11,617,905
Boots and shoes, other than rubber	1,081	14,895	215,780	29,050,826	191,562,391	416,904,799	769,290,993	352,386,194
Candles	22	178	725	448,472	686,003	2,624,206	5,351,513	2,727,307
Cement	158	2,704	26,426	6,671,460	34,070,128	69,979,215	183,201,048	113,221,833
Cleaning and polishing preparations	363	1,498	3,341	3,643,065	3,942,632	23,643,872	57,871,416	34,227,544
Coke-oven products	94	2,111	20,603	5,694,952	33,102,643	273,067,707	357,468,778	84,401,071
Compressed and liquefied gases	356	1,525	4,655	3,135,279	6,590,844	14,243,865	56,417,673	42,173,808
Corn syrup, corn sugar, corn oil and starch	27	1,127	7,011	3,080,075	10,411,461	96,462,119	135,819,685	39,357,566
Drug grinding	21	107	699	412,030	849,301	4,762,142	7,935,179	3,173,037
Drugs and medicines	1,013	9,839	24,095	22,867,775	26,115,890	98,821,718	345,918,343	247,096,625
Dyeing and finishing, cotton fabrics	246	5,297	49,635	12,474,616	49,111,663	103,026,624	201,707,064	98,680,440
Dyeing and finishing, rayon- and silk-fabric	159	1,978	18,003	5,058,902	19,633,038	22,808,641	57,599,396	34,790,755
Dyeing and finishing yarn (cotton, rayon, and silk)—for sale or on commission	128	816	7,344	2,320,397	6,985,570	6,815,003	21,610,782	14,795,779
Electroplating	547	1,074	8,256	2,472,663	9,827,777	6,814,636	26,686,411	19,871,775
Explosives	77	773	5,406	2,057,495	8,620,222	24,212,733	58,181,337	33,968,604
Fertilizers	743	3,349	20,893	6,369,901	15,364,169	130,080,550	195,759,025	65,678,475
Fireworks and allied products	50	202	1,760	529,171	1,621,153	3,695,038	8,128,186	4,433,148
Flavoring extracts, flavoring syrups, and related products	398	1,655	4,162	4,017,604	4,274,145	46,279,888	117,897,193	71,617,305
Glass	232	7,956	79,051	17,803,799	101,587,694	140,705,050	387,709,563	247,004,513
Glue and gelatin	75	612	3,547	1,827,177	4,565,134	23,390,959	40,649,934	17,258,975
Gold, silver, and platinum, refining and alloying	65	431	1,085	1,190,015	1,560,529	85,207,766	92,093,302	6,885,536
Graphite, ground and refined	6	24	56	78,791	73,917	728,573	1,077,529	348,956
Grease and tallow, not including lubricating greases	266	878	5,200	2,259,124	6,763,308	32,980,190	52,268,767	19,288,577
Hosiery	746	6,799	150,960	15,182,473	136,567,792	160,431,652	362,511,768	202,080,116
Ice, manufactured	3,847	6,016	18,705	11,067,228	21,603,338	27,516,835	136,541,982	109,025,147
Ink, printing	184	1,134	2,793	3,183,430	4,084,886	25,103,530	47,346,545	22,243,015
Ink, writing	17	99	366	219,884	370,319	1,499,956	3,475,600	1,975,644
Insecticides and fungicides, and industrial household chemical comps. not elsewhere classified	573	2,454	4,322	5,678,684	4,659,372	34,103,393	71,168,239	37,064,846
Leather: Tanned, curried, and finished—regular factories	331	3,482	48,132	9,907,358	58,332,160	279,220,257	387,908,170	108,687,913
Leather: Tanned, curried, and finished—contract factories	71	258	2,555	830,129	2,956,215	2,285,824	7,114,143	4,828,319
Lime	203	775	9,751	1,563,100	9,610,096	13,286,679	35,021,960	21,735,281
Linoleum	3	442	4,827	918,176	6,604,395	15,278,206	35,636,540	20,358,334
Lithographing	552	5,795	24,079	15,960,691	35,928,073	54,318,911	137,730,581	83,411,670
Lubricating oils and greases, not made in petroleum refineries	195	1,029	2,231	2,469,457	2,839,411	25,387,284	44,112,635	18,725,351
Minerals and earths, ground or otherwise treated	157	692	4,539	1,713,822	4,897,581	11,612,565	27,160,982	15,548,417
Mucilage, paste, and other adhesives, except glue and rubber cement	61	184	295	421,850	313,416	2,165,002	4,209,629	2,044,627
Nonclay refractories	40	349	5,641	887,277	6,330,518	12,538,034	28,457,233	15,919,199
Nonferrous-metal alloys; nonferrous-metal products, except aluminum, not elsewhere classified	1,103	11,763	83,016	27,779,486	115,514,739	392,683,232	669,373,994	276,690,762
Oil, cake, and meal, cottonseed	447	2,786	16,583	5,650,204	8,531,570	195,746,709	242,042,808	46,296,099
Oil, cake, and meal, linseed	23	231	2,628	534,914	3,591,310	74,481,070	90,356,528	15,875,458
Oils, essential	13	64	195	199,016	265,515	2,933,421	3,981,207	1,047,786
Oils not elsewhere classified	105	541	2,474	1,434,995	2,962,423	56,111,488	69,476,214	13,364,726
Paints, pigments, and varnishes	1,124	11,995	31,664	28,522,068	42,750,662	312,085,415	538,460,629	226,375,214
Paper	647	11,726	110,809	31,820,404	142,079,857	567,449,130	957,939,764	390,490,634
Perfumes, cosmetics, and other toilet preparations	478	2,905	10,158	6,252,529	9,261,533	53,905,342	132,336,481	78,431,139
Petroleum refining	365	15,268	83,182	36,393,120	140,414,750	2,064,306,627	2,546,745,730	482,439,103
Pulp (wood and other fiber)	194	2,153	26,994	5,150,655	33,570,346	153,651,946	247,191,957	93,540,011
Rayon and allied products	33	5,172	55,098	11,579,071	65,291,053	80,615,893	254,697,216	174,081,323
Roofing, built-up and roll; asphalt shingles; roof coatings other than paint	111	1,102	7,418	2,311,001	9,519,685	62,644,290	102,561,748	39,917,458
Rubber goods other than tires, inner tubes, and boots and shoes	420	6,820	48,172	15,474,489	54,176,139	119,927,413	242,716,952	122,789,539
Rubber tires and inner tubes	46	10,952	63,290	25,323,979	96,706,731	366,858,443	575,860,262	209,001,819
Silk broad woven goods (18 inches wide and over)	194	1,071	17,597	2,055,271	14,010,310	38,885,731	63,097,641	24,211,910
Silk narrow fabrics	81	391	4,527	1,049,672	4,201,011	5,525,038	13,769,856	8,244,818
Smelting and refining, copper	23	1,911	14,514	4,126,566	20,941,462	645,293,627	715,354,577	70,060,950
Smelting and refining, lead	14	672	4,036	1,529,166	5,546,558	234,071,820	253,597,853	19,526,033
Smelting and refining, nonferrous metals other than gold, silver, and platinum, not from the ore	103	1,095	4,973	2,919,083	5,972,117	94,051,751	113,006,897	18,955,146
Smelting and refining, zinc	25	1,087	11,265	2,964,950	16,767,128	75,452,363	115,654,535	40,202,172
Soap	232	3,620	14,008	7,704,234	19,074,574	185,169,789	301,291,547	116,121,758
Stamped and pressed metal products; enameling, japanning, and lacquering	743	7,847	61,092	19,575,031	73,140,981	148,148,069	294,039,010	145,890,941
Sugar, beet	87	1,571	9,366	3,365,998	11,732,690	68,996,104	107,395,536	38,399,432
Sugar, refining, cane	23	1,694	14,024	3,968,813	15,973,300	362,652,689	424,630,784	61,978,095
Synthetic-resin, cellulose-plastic, vulcanized-fiber, and molded and pressed pulp fabricated articles, not elsewhere classified	160	2,108	16,673	4,875,538	19,822,100	32,044,670	77,715,723	45,671,053
Tanning materials, natural dyestuffs, mordants and assistants, and sizes	158	835	2,812	2,416,015	2,999,868	22,603,478	35,684,573	13,081,095
Turpentine and rosin	993	1,308	1,506	868,640	350,035	22,669,680	29,025,461	6,355,781
Wallboard and plaster (except gypsum), building insulation. and floor composition	114	958	6,383	1,747,126	6,691,482	15,651,865	41,049,422	25,397,557
Wall paper	42	628	4,543	1,658,517	5,455,289	11,919,748	26,771,995	14,852,247
Wood distillation and charcoal manufacture	60	557	4,467	1,065,946	4,024,409	11,327,569	26,144,984	14,817,415
Wood preserving	197	950	12,401	1,953,062	11,338,356	84,684,269	116,699,580	32,015,311
Woolen and worsted dyeing and finishing	53	383	2,563	1,233,860	2,806,822	4,675,310	11,062,761	6,387,451
Woolen yarn	41	227	2,749	682,430	2,777,402	8,593,959	13,558,498	4,964,539

Although the Biennial Census of Manufactures, issued by the Bureau of the Census, does not and, of course, cannot give the current statistical status of industry, it does afford a most valuable source for trend studies, and in many instances, provides the only reliable figures available.

The manufacturing industries of the

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Biennial Census of Manufactures

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U. S. employed 19% more wage earners in '37 than in '35, paid 38.3% more in wages and 34.4% more for materials, and turned out products whose combined value exceeded the 1935 total by 34.9%, according to preliminary figures compiled from the returns of the recent Biennial Census of Manufactures.

The 1937 figures to which the above percentages refer are: Wage earners (average for the year), 8,569,578; wages, $10,112,808,089; cost of materials, containers, fuel, purchased electric energy, and cost of contract work, $35,536,139,648; value of products, $60,710,072,958. These figures include data for printing and publishing.

The cost of materials, fuel, etc., and the value of products are gross totals which necessarily include large amounts of duplication due to the use of the products of some industries as materials in others. Careful estimates by the Bureau of the Census indicate that the *net* value (at f.o.b. factory prices, *not* retail prices) of finished manufactured products made in 1929, in the form in which they reached ultimate consumers, was approximately two-thirds of the gross value. No corresponding estimates for later years have been made by this Bureau.

The cost of contract work forms, in effect, a part of the cost of materials as delivered at the factories, in the respective industries, and is included in the cost-of-materials figures in this report for 1937 and 1935. In 1935, the cost of contract work amounted to $462,318,169; corresponding figures for 1937 will be given in a later report. The cost of contract work was not reported for all industries for 1933 and is therefore not included with the cost of materials for that year.

The "Value added by manufacture" (calculated by subtracting cost of materials, fuel, purchased electric energy and contract work from value of products) for 1937 was $25,173,933,310, an increase of 35.7%, as compared with $18,553,279,851, for 1935.

The amount remaining after deducting the combined outlay in 1937 for salaries, wages, materials, containers, fuel, electric energy and cost of contract work, (the only items of expense covered by the Census of Manufactures) from value of products was $12,344,651,465. This residue covers various overhead costs—such as interest, rent, depreciation, taxes (except internal-revenue taxes, which are included in cost of materials), insurance, and advertising—and in addition includes what may be termed "factory profits," but does not include the profits accruing from the business done by separate sales departments operated by manufacturing concerns. The residual amount in question shows an increase of 37.3% as compared with $8,988,525,945 for 1935.

Chemicals (N. E. C.)

Manufacturers of chemicals reported a moderate increase in employment and considerable increase in wages and values of products for '37, as compared with '35, according to the preliminary figures released by the Bureau of the Census.

The number of wage earners employed in '37 was 78,951, an increase of 19.9% as compared with 65,838 for 1935. In 1929 the number was but 62,199. Wages paid in '37 amounted to $117,221,112, an increase of 45.7% over $80,480,605, the figure for '35. The total value of the products of the industry for '37, $932,749,910, exceeds the '35 figure, $668,697,448, by 39.5%. The '29 figure was $738,048,386. Thus it is seen that by 1929 standards the chemical industry has not only recovered, but has made sensational gains. "Chemicals Not Elsewhere Classified", as classified for Census purposes, embraces establishments engaged primarily in the production of chemicals other than those classified as explosives, fertilizers, soaps, and wood-distillation products, which are assigned to separate classifications.

Summary for Chemicals (not elsewhere classified)
1937, '35, '33*

	1937	1935	1933	Per cent. of increase 1935-1937	1933-1937
Number of establishments	601	570	541	5.4	11.1
Wage earners (average for the year)[1]	78,951	65,838	53,190	19.9	48.4
Wages[2]	$117,221,112	$80,480,605	$59,228,692	45.7	97.9
Cost of materials, supplies, containers, fuel, and purchased electric energy[2]	$455,061,975	$329,350,435	$221,453,486	38.2	105.5
Value of products[2]	$932,749,910	$668,697,448	$476,502,663	39.5	95.7
Value added by manufacture[3]	$477,687,935	$339,347,013	$255,049,177	40.8	87.3

Blacking, Stains, and Dressings

This industry, as classified for Census purposes, embraces establishments engaged primarily in the manufacture of blacking, waxes, stains, dressings for leather and other materials, stove polish, burnishing inks, and related products.

	1937	1935	1933	1935-1937	1933-1937
Number of establishments	147	167	154	—12.0	—4.5
Wage earners (average for the year)[1]	1,536	1,498	1,625	2.5	—5.5
Wages[2]	$1,479,735	$1,467,345	$1,504,329	0.8	—1.6
Cost of materials, supplies, containers, fuel, and purchased electric energy[2]	$7,988,251	$8,387,361	$6,909,441	—4.8	15.6
Value of products[2]	$19,182,557	$17,931,563	$19,055,750	7.0	0.7
Value added by manufacture[3]	$11,194,306	$9,544,202	$12,146,309	17.3	—7.8

Bone Black, Carbon Black, and Lampblack[z]

This industry, as classified for Census purposes, embraces establishments engaged primarily in the manufacture of bone black, carbon black, and lampblack. Bone black, also known as "char", or animal charcoal, is produced by the carbonization of bone in retorts; carbon black, by the imperfect combustion of natural gas; and lampblack, by the imperfect combustion of coal or wood tar, petroleum, rosin, etc.

	1937	1935	1933	1935-1937	1933-1937
Number of establishments	62	55	48	(*)	(*)
Wage earners (average for the year)[1]	2,190	1,828	1,449	19.8	51.1
Wages[2]	$2,711,599	$1,936,570	$1,205,529	40.0	124.9
Cost of materials, supplies, containers, fuel, and purchased electric energy[2]	$7,235,671	$5,334,329	$4,010.163	35.6	80.4
Value of products[2]	$18,853,576	$14,811,298	$8,506,709	27.3	121.6
Value added by manufacture[3]	$11,617,905	$9,476,969	$4,496,546	22.6	158.4

Cleaning and Polishing Preparations

This industry, as classified for Census purposes, embraces establishments engaged primarily in the manufacture of cleansers, washing powders, and washing compounds containing no soap; dry-cleaning preparations: metal, automobile, and other polishes; and paint and varnish removers. (Cleaners, washing powders, and washing compounds containing soap are made to some extent as secondary products by these establishments, but are manufactured principally by establishments classified in the Soap industry.)

	1937	1935	1933	1935-1937	1933-1937
Number of establishments	363	395	327	—8.1	11.0

z See page 4 for breakdown by products.

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Cleaning and Polishing Preparations (Cont'd)

	1937	1935	1933	Per cent. of increase or decrease (—) 1935-1937	1933-1937
Wage earners (average for the year)[1]	3,341	2,824	2,755	18.3	21.3
Wages[2]	$3,942,632	$3,032,976	$2,721,985	30.0	44.8
Cost of materials, supplies, containers, fuel, and purchased electric energy[2]	$23,643,872	$17,282,575	$14,752,539	36.8	60.3
Value of products[2]	$57,871,416	$42,406,982	$41,048,318	36.5	41.0
Value added by manufacture[3]	$34,227,544	$25,124,407	$26,295,779	36.2	30.2

Coke-Oven Products

This industry, as classified for Census purposes, embraces establishments engaged primarily in the manufacture of coke by distillation of coal. Establishments which, although they operate coke ovens, are engaged primarily in the production and distribution of gas for illuminating and heating are classified under the industry designation "Gas, Manufactured, Illuminating and Heating."

	1937	1935	1933	1935-1937	1933-1937
Number of establishments	94	88	97	(*)	(*)
Wage earners (average for the year)[1]	20,603	16,694	13,066	23.4	57.7
Wages[2]	$33,102,643	$21,575,184	$15,526,645	53.4	113.2
Cost of materials, supplies, containers, fuel, and purchased electric energy[2]	$273,067,707	$180,557,083	$123,275,080	51.2	121.5
Value of products[2]	$357,468,778	$238,703,683	$165,731,226	49.8	115.7
Value added by manufacture[3]	$84,401,071	$58,146,600	$42,456,146	45.2	98.8

Fertilizers

This industry, as classified for Census purposes, embraces establishments engaged primarily in the manufacture of chemical preparations for which the principal classes are complete fertilizers (mixtures of superphosphates, potash, and ammoniates) and superphosphates. It does not include the merchandising of fertilizer materials for use in the natural state, nor of tankage from meat-packing establishments for use without remanufacture.

	1937	1935	1933	1935-1937	1933-1937
Number of establishments	743	670	522	10.9	42.3
Wage earners (average for the year)[1]	20,893	17,473	13,063	19.6	59.9
Wages[2]	$15,364,169	$10,967,021	$7,274,317	40.1	111.2
Cost of materials, supplies, containers, fuel, and purchased electric energy[2]	$130,080,550	$93,364,695	$69,053,111	39.3	88.4
Value of products[2]	$195,759,025	$140,386,112	$94,939,311	39.4	106.2
Value added by manufacture[3]	$65,678,475	$47,021,417	$25,886,200	39.7	153.7

Inks, Printing

This industry, as classified for Census purposes, embraces establishments engaged primarily in the manufacture of printing inks of various colors, gold and bronze inks, and lithographing inks.

	1937	1935	1933	1935-1937	1933-1937
Number of establishments	184	191	171	—3.7	7.6
Wage earners (average for the year)[1]	2,793	2,370	2,247	17.8	24.3
Wages[2]	$4,084,886	$3,234,361	$3,479,344	26.3	17.4
Cost of materials, supplies, containers, fuel, and purchased electric energy[2]	$25,103,530	$18,594,167	$14,532,021	35.0	72.7
Value of products[2]	$47,346,545	$34,534,951	$32,188,398	37.1	47.1
Value added by manufacture[3]	$22,243,015	$15,940,784	$17,656,377	39.5	26.0

Inks, Writing

	1937	1935	1933	1935-1937	1933-1937
Number of establishments	17	22	22	(*)	(*)
Wage earners (average for the year)[1]	366	377	355	—2.9	3.1
Wages[2]	$370,319	$379,506	$321,281	—2.4	15.3
Cost of materials, supplies, containers, fuel, and purchased electric energy[2]	$1,499,956	$1,414,541	$1,226,495	6.0	22.3
Value of products[2], [3]	$3,475,600	$3,381,907	$2,522,118	2.8	37.8
Value added by manufacture[4]	$1,975,644	$1,967,366	$1,295,623	0.4	52.5

Insecticides and Fungicides & Industrial & Household Chemicals

This industry, as classified for Census purposes, embraces establishments engaged primarily in the manufacture of chemical preparations for industrial, agricultural, and household use. It does not cover the manufacture of proprietary medicines nor of cosmetics and other toilet preparations, which are assigned to other industry classifications.

	1937	1935	1933	1935-1937	1933-1937
Number of establishments	573	546	380	4.9	50.8
Wage earners (average for the year)[1]	4,322	3,466	1,977	24.7	118.6
Wages[2]	$4,659,372	$3,401,387	$1,856,430	37.0	151.0
Cost of materials, supplies, containers, fuel, and purchased electric energy[2]	$34,103,393	$24,343,531	$11,210,546	40.1	204.2
Value of products[2]	$71,168,239	$53,429,197	$27,908,314	33.2	155.0
Value added by manufacture[3]	$37,064,846	$29,085,666	$16,697,768	27.4	122.0

Lime[x]

	1937	1935	1933	1935-1937	1933-1937
Number of establishments	203	189	203	7.4	...
Wage earners (average for the year)[1]	9,751	7,497	6,706	30.1	45.4
Wages[2]	$9,610,096	$6,052,109	$6,012,411	58.8	59.8
Cost of materials, supplies, containers, fuel, and purchased electric energy[2]	$13,286,679	$8,925,640	$8,895,504	48.9	49.4
Value of products[2]	$35,021,960	$23,322,071	$22,199,792	50.2	57.8
Value added by manufacture[3]	$21,735,281	$14,396,431	$13,304,288	51.0	63.4

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* Plants with annual production valued at less than $5,000 excluded.

[1] Not including salaried officers and employees. Data for such officers and employees will be included in a later report. The item for wage earners is an average of the number reported for the several months of the year. In calculating it, equal weight must be given to full-time and part-time wage earners (not reported separately by the manufacturers), and for this reason it exceeds the number that would have been required to perform the work done in the industry if all wage earners had been continuously employed throughout the year. The quotient obtained by dividing the amount of wages by the average number of wage earners cannot, therefore, be accepted as representing the average wage received by full-time wage earners. In making comparisons between the figures for 1937 and those for earlier years, the possibility that the proportion of part-time employment varied from year to year should be taken into account.

[2] Profits or losses cannot be calculated from the Census figures because no data are collected for certain expense items, such as interest, rent, depreciation, taxes, insurance, and advertising.

[3] Value of products less cost of materials, supplies, containers, fuel, and purchased electric energy.

x See page 4 for breakdown by type of lime.

Biennial Census of Manufactures

Preliminary Figures for 1937—p. 4

Minerals and Earths

This industry, as classified for Census purposes, embraces establishments engaged primarily in the grinding or pulverizing of certain earths, rocks, or minerals such as barytes, borax, chalk, clays, Cornwall stone, corundum, emery, feldspar, kaolin, mica, pumice, quartz, silica, sulfur, talc, etc.

	1937	1935	1933	Per cent. of increase or decrease (—) 1935-1937	1933-1937
Number of establishments	157	161	107	—2.5	46.7
Wage earners (average for the year)[1]	4,539	4,258	1,874	6.6	142.2
Wages[2]	$4,897,581	$3,614,118	$1,564,546	35.5	213.0
Cost of materials, supplies, containers, fuel, and purchased electric energy[2]	$11,612,565	$8,686,143	$4,389,305	33.7	164.6
Value of products[2]	$27,160,982	$21,544,977	$9,684,088	26.1	180.5
Value added by manufacture[3]	$15,548,417	$12,858,834	$5,294,783	20.9	193.7

Oils Not Elsewhere Classified

This industry, as classified for Census purposes, embraces establishments engaged primarily in the production of animal oils such as fish, lard, and neatsfoot and of certain crude vegetable oils, such as castor, coconut, palm, soybean, etc. It does not include the production of cottonseed, linseed, and essential oils, each of these being separately classified.

	1937	1935	1933	1935-1937	1933-1937
Number of establishments	105	106	58	—0.9	(*)
Wage earners (average for the year)[1]	2,474	1,770	931	39.8	165.7
Wages[2]	$2,962,423	$1,814,179	$970,258	63.3	205.3
Cost of materials, supplies, containers, fuel, and purchased electric energy[2]	$56,111,488	[3]$30,904,772	$15,625,029	81.6	259.1
Value of products[2]	$69,476,214	$41,736,942	$22,254,137	66.5	212.2
Value added by manufacture[4]	$13,364,726	[3]$10,832,170	$6,629,108	23.4	101.6

Paints, Pigments & Varnishes

This industry, as classified for Census purposes, embraces establishments engaged primarily in the manufacture of pigments or colors (other than bone black, and lampblack), paints in paste form, paints mixed ready for use, varnishes, lacquers, enamels, etc.

	1937	1935	1933	1935-1937	1933-1937
Number of establishments	1,124	1,082	961	3.9	17.0
Wage earners (average for the year)[1]	31,664	27,686	22,880	14.4	38.4
Wages[2]	$42,750,662	$32,186,867	$23,790,537	32.8	79.7
Cost of materials, supplies, containers, fuel, and purchased electric energy[2]	$312,085,415	$231,982,952	$153,026,437	34.5	103.9
Value of products[2]	$538,460,629	$416,999,566	$289,441,956	29.1	86.0
Value added by manufacture[3]	$226,375,214	$185,016,614	$136,415,519	22.4	65.9

Smelting and Refining Copper

	1937	1935	1933	1935-1937	1933-1937
Number of establishments	23	20	19	(*)	(*)
Wage earners (average for the year)[1]	14,514	10,449	5,596	38.9	159.4
Wages[2]	$20,941,462	$11,154,196	$5,386,550	87.7	288.8
Cost of materials, supplies, containers, fuel, and purchased electric energy[2]	$645,293,627	$310,797,456	$142,672,253	107.6	352.3
Value of products[2]	$715,354,577	$348,257,026	$158,610,406	105.4	351.0
Value added by manufacture[3]	$70,060,950	$37,459,570	$15,938,153	87.0	339.6

Smelting and Refining of Lead

	1937	1935	1933	1935-1937	1933-1937
Number of establishments	14	16	14	(*)	..
Wage earners (average for the year)[1]	4,036	3,187	2,105	26.6	91.7
Wages[2]	$5,546,558	$3,423,931	$2,324,913	62.0	138.6
Cost of materials, supplies, containers, fuel, and purchased electric energy[2]	$234,071,820	$121,996,765	$60,533,700	91.9	286.7
Value of products[2]	$253,597,853	$137,219,290	$70,453,429	84.8	260.0
Value added by manufacture[3]	$19,526,033	$15,222,525	$9,919,729	28.3	96.8

Smelting and Refining Zinc

	1937	1935	1933	1935-1937	1933-1937
Number of establishments	25	26	26	(*)	(*)
Wage earners (average for the year)[1]	11,265	8,842	6,866	27.4	64.1
Wages[2]	$16,767,128	$10,309,175	$5,837,808	62.6	187.2
Cost of materials, supplies, containers, fuel, and purchased electric energy[2]	$75,452,363	$43,572,209	$28,678,726	73.2	163.1
Value of products[2]	$115,654,535	$69,150,779	$44,221,740	67.2	161.5
Value added by manufacture[3]	$40,202,172	$25,578,570	$15,543,014	57.2	158.7

For explanation of footnotes, see previous page.

Lime

	1937	1935
Lime industry, all products, total value	$35,021,960	$23,322,071
Lime	25,988,481	18,423,448
Other products (not normally belonging to the industry)	9,033,479	4,898,623
Lime made as a secondary product in other industries, value	676,422	548,624
Lime, all kinds:—		
Total, tons	3,716,820	2,567,709
Total value	$26,664,903	$18,972,072
Quicklime—		
Tons	2,143,517	1,473,991
Value	$14,847,633	$10,403,914
Hydrated lime—		
Tons	1,119,437	840,724
Value	$9,698,984	$7,101,372
Agricultural lime—		
Tons	453,866	252,994
Value	$2,118,286	$1,466,786

Pigments

	1937	1935
"Bone black, carbon black, and lampblack" industry, all products, total value	$18,853,576	$14,811,298
Bone black, carbon black, and lampblack	$18,554,724	$14,650,255
Other products (not normally belonging to the industry)	$298,852	$161,043
Bone black, carbon black, and lampblack made as secondary products in other industries, value	$1,023,957	$803,258
Bone black, carbon black, and lampblack, total—lbs.	551,487,051	389,573,266
Value (sum of 2 and 4)	$19,578,681	$15,453,513

	1937	1935
Bone black:—		
lbs.	35,571,397	32,922,190
Value	$1,717,160	$1,312,972
Carbon black:—*		
lbs.	510,606,343	352,749,000
Value	$17,389,000	$13,755,000
Lampblack:—		
lbs.	5,309,311	3,902,076
Value	$472,521	$385,541

* From reports of the U. S. Bureau of Mines, Dept. of the Interior.

Additional census of manufactures statistics will be given next month.

The Summary on nitrogen issued annually by British Sulphate of Ammonia Federation, Ltd., will also appear in the next issue.

Agricultural Chemicals

Production granular fertilizers, using ammonium nitrate in process. No. 2,136,069. Herman A. Beekhuis, Jr., Petersburg, Va., to Solvay Process Co., New York City.

Continuous process of manufacturing superphosphate to produce accelerated curing. No. 2,136,793. Wm. Harold Gabeler, Alvin Chesley Wilson, Thos. Orkney Tongue, and Mark Shoeld, Balto., Md., to Davison Chemical Corp., corp. of Md.

Production nitrogenous fertilizer base from feathers. No. 2,137,365. Stanley Strong, Cockeysville, and Wm. J. Gascoyne, Jr., Balto., Md., to Wm. J. Gascoyne, Jr., Balto., Md.

Manufacture double or treble calcium and magnesium superphosphate. No. 2,137,674. Walter H. MacIntire, Knoxville, Tenn.

Method making stable phosphatic fertilizers; first treating phosphate rock with a volatile inorganic acid in the presence of water. No. 2,134,013. John W. Turrentine, Washington, D. C.

Cellulose

Preparation mixed cellulose ester containing acetyl and fatty acid groups of 3-4 carbon atoms. No. 2,135,979. Carl J. Malm to Eastman Kodak Co., both of Rochester, N. Y.

Method refining a cellulose derivative to remove objectionable coloration, by treatment with a liquid consisting of aqueous hydrogen peroxide. No. 2,135,980. Carl J. Malm to Eastman Kodak Co., both of Rochester, N. Y.

Preparation cellulose esters. No. 2,136,030. Herbert G. Stone, Kingsport, Tenn., to Eastman Kodak Co., Rochester, N. Y.

Production nitrogen-containing cellulose derivatives. No. 2,136,296. Vernal R. Hardy to du Pont, both of Wilmington, Del.

Preparation amino cellulose derivatives. No. 2,136,299. Jos. E. Haskins to du Pont, both of Wilmington, Del.

Cellulose derivative compositions, comprising a cellulose derivative and an ester of cativic acid. No. 2,136,384. Nicholas L. Kalman, Cambridge, Mass.

Shrinkable film or pellicle composed of a non-fibrous cellulosic material and finely divided natural, flake graphite having an average particle size between 15 and 150 microns in diameter. No. 2,137,301. Thos. F. Banigan, Kenmore, N. Y., to du Pont, Wilmington, Del.

Preparation low-substituted cellulosic ethers. No. 2,137,343. Robt. W. Maxwell to du Pont, both of Wilmington, Del.

Process impregnating wood chips. No. 2,137,779. Fredrich Olsen, East Alton, Ill., to Cellulose Research Corp., corp. of Del.

Impregnating cellulose with 3:3'-diamino-diphenyl-urea which has been azotized and coupled to 2 mols. of 2 (3' -amino-benzoyl-amino) 5-naphthol-7-sulfonic acid, rinsing dyed fabric, azotizing color thereon, and coupling with beta-naphthol. No. 2,137,810. Swanie E. Rossander to du Pont, both of Wilmington, Del.

Manufacture artificial products from cuprammonium cellulose solutions, according to stretch spinning method. No. 2,137,955. Walther Schieber, Berlin, and Walter Harz, Dormagen-I.G. Werk, Germany, to I. G., Frankfort-am-Main, Germany.

Preparation organic derivatives of cellulose. No. 2,138,145. Camille Dreyfus, New York City, and George Schneider, Montclair, N. J., to Celanese Corp. of America, corp. of Del.

Process for removing sulfur impurities from cellulose esters. No. 2,138,146. Camille Dreyfus, New York City, and Wm. Whitehead, Cumberland, Md., to Celanese Corp. of America, corp. of Del.

Production transparent organic derivatives of cellulose. No. 2,138,184. Herbert E. Martin, Cumberland, Md., to Celanese Corp. of America, corp. of Del.

Applying to a cellulose ester a diazotization component suitable for manufacture azo dyestuffs, diazotizing and coupling it with a compound of the group of diphenylene compounds. No. 2,138,553. Friedrich Wilhelm Muth, Leverkusen-I. G. Werk, Germany, to General Aniline Works, New York City.

Recovery of lower aliphatic acids; treatment-dilute aqueous acetic acid solution, containing dissolved and/or suspended cellulose compounds resulting from manufacture of cellulose acetate, and free sulfuric acid. No. 2,138,582. Paul Knapp, Waynesboro, Va., to du Pont, Wilmington, Del.

Preparation organic-soluble mixed non-olefinic aliphatic methallyl ethers of cellulose. No. 2,134,086. Robt. W. Maxwell to du Pont, both of Wilmington, Del.

Method treating a crude alkyl ether of cellulose. No. 2,138,757. Wm. R. Collings and Toivo A. Kauppi, to Dow Chemical Co., all of Midland, Mich.

Preparation cellulose esters of organic sulfonic acids. No. 2,138,778. Geo. W. Rigby to du Pont, both of Wilmington, Del.

Process stabilizing a cellulose acetobutyrate; introducing a crude cellulose acetobutyrate into anhydrous, liquid ammonia. No. 2,139,661. Rudolph S. Bley, Milligan College, Tenn., to North American Rayon Corp., New York City.

Process stabilizing cellulose derivatives. Nos. 2,139,662-3. Rudolph S. Bley, Milligan College, Tenn., to North American Rayon Corp., New York City.

Process stabilizing a saturated cellulose ester; introducing a crude, saturated fatty acid ester of cellulose into anhydrous, liquid ammonia. No. 2,139,664. Rudolph S. Bley, Elizabethton, Tenn., to North American Rayon Corp., New York City.

Coloring cellulose esters. No. 2,139,787. August Wingler, Leverkusen-I. G., Werk, and Heinrich Ohlendorf and Hans Lange, Dessau in Anhalt, Germany, to General Aniline Works, New York City.

Production aqueous dispersions of cellulose derivatives. No. 2,139,866. Chas. Richard Noel Strouts, Ardrossan, Scotland, to Imperial Chemical Industries, corp. of Great Britain.

Chemical Specialty

Manufacture abrasive articles; preparing suspension of abrasive particles in a solution of a polyvinyl ester in an alcohol, and adding a catalyst to cause reaction between the alcohol and ester. No. 2,135,626. Norman P. Robie to Carborundum Co., both of Niagara Falls, N. Y.

Waxy ink compositions for carbon papers, typewriter ribbons and other duplicating media; composed of a higher molecular aliphatic alcohol having at least 12 carbon atoms and containing a dye. No. 2,135,735. Emil Schwabe, Buenos Aires, Argentina, to American Hyalsol Corp., Wilmington, Del.

Glue comprising reaction product of cottonseed flour, water soluble blood albumin, sodium metasilicate, and hydrated lime. No. 2,135,745. Chas. N. Cone to M. & M. Plywood Corp., both of Portland, Ore.

Cement including a body of aggregate compounded with a body of sulfur that carries in solution an olefine polysulfide. No. 2,135,747. Werner W. Duecker, Pittsburgh, Pa., to Texas Gulf Sulphur Co., New York City.

Production fluid bituminous emulsions of mixing grade; first adding trisodium phosphate to a low viscosity, quick-breaking, clay-free emulsion. No. 2,135,866. Parke Lowe Boneysteele and Manford Lemuel McKercher, Balto., Md., to American Bitumuls Co., San Francisco, Calif.

An exposed developed and dried blue-print sheet of the iron-cyanide type, containing as residue therein oxalate salt and a halogenated oxidizing agent, print being non-fading on exposure to actinic light. No. 2,135,872. Walker M. Hinman, Winnetka, Ill., to Frederick Post Co., Chicago, Ill.

Manufacture thixotropic paint; incorporating water and pigment in an oil paint vehicle, pigment having its surfaces coated with a hydrophile substance. No. 2,135,936. David L. Gamble and Lester W. Grady, Jr., Palmerton, Pa., to New Jersey Zinc Co., corp. of N. J.

Electric cable comprised of plurality of individual conductors. No. 2,135,985. Earle A. Mitchell, Hastings-on-Hudson, N. Y., to Phelps Dodge Copper Products Corp., New York City.

Non-aqueous insect spray that is a dilute solution of at least one insect poison and an anhydrous wetting agent in an anhydrous organic liquid. No. 2,135,987. Donald F. Murphy, Bristol, Pa., to Rohm & Haas Co., Phila., Pa.

Production emulsions; composition capable of being dispersed or emulsified in aqueous media, comprising a solid chlorinated naphthalene incorporated with hydrogenated naphthalene. No. 2,136,020. Harold Pirie, Runcorn, England, to Imperial Chemical Industries, London, England.

Manufacture abrasive articles. No. 2,136,022. Walter D. Rossow to Sterling Grinding Wheel Co., both of Tiffin, Ohio.

Fast-drying printing ink composition, composed of a mixture of pigments, chlorinated oil, and a water paste including a reactive metallic substance. No. 2,136,108. Walter J. Koenig, Phila., Pa., to Sloane-Blabon Corp., Trenton, N. J.

Method sizing paper; treating pulp, before formation into a paper sheet, with a vinyl aliphatic acetal resin soluble in water at below 5°C. No. 2,136,110. Gerould T. Lane and Ralph W. Peters, Rochester, N. Y., to Eastman Kodak Co., Jersey City, N. J.

Non-curling, coated abrasive product. No. 2,136,150. Nicholas Ewing Oglesby to Behr-Manning Corp., both of Troy, N. Y.

Method stripping a photographic negative having an image-bearing layer of nitro-cellulose which is superimposed upon a plate; using in process a coating of solution made from cellulose derivative and evaporable solvent. No. 2,136,176. John M. Hammond, Washington, D. C., to Varnish Products Co., Cleveland, O.

Manufacture lead storage battery electrode, the paste ingredients of which have been treated with a solution of phenol, and a subsequent treatment with dilute sulfuric acid and formaldehyde. No. 2,136,241. Harold R. Harner, Frederick H. Schultz, and Everett J. Ritchie, Joplin, Mo., to Eagle-Picher Lead Co., Cincinnati, O.

Process treating waxes. No. 2,136,282. Henry Randel Dickinson, Grand Rapids, Mich.

Coating for lumber to prevent end checking; coating comprised of petroleum asphalt and asbestos fibre. No. 2,136,351. Milton Gray to E. L. Bruce Co., both of Memphis, Tenn.

Manufacture metallic inlaid friction surfaces of the type comprising a fibrous filler and a heat hardenable binder. No. 2,136,370. Chris Bockius, Stamford, Conn., Clyde S. Batchelor, Hasbrouck Heights, and Judson A. Cook, Haledon, N. J., to Raybestos-Manhattan, Inc., Passaic, N. J.

Improved lubricating composition of high stability. No. 2,136,391. Floyd L. Miller, Elizabeth, N. J., to Standard Oil Development Co., corp. of Del.

Method removing scale from boilers. No. 2,136,392. Daniel Francis Murphy, Galveston, Tex.

Polish composition in form of an oil in water emulsion, comprising water as a continuous phase and a petroleum distillate as a discontinuous phase; blown castor oil being dispersed in the petroleum distillate. No. 2,136,402. Jos. A. Tumbler to J. A. Tumbler Labs., both of Balto., Md.

Fabric for protecting silverware from tarnishing; being a material suitable for wrapping, impregnated with a phosphate of silver. No. 2,136,483. Kenneth H. Barnard and Arthur F. McLean, Andover, Mass., to Pacific Mills, Lawrence, Mass.

Waterproof and greaseproof container, comprising a fibrous base made greaseproof and waterproof by treatment with a fatty material that is solid at 40°C. No. 2,136,557. Angus MacLachlan, deceased, late of Metuchen, N. J., by Walter H. Griffin, executor, New York City.

Stable oil-in-water emulsion comprising an asphaltic bitumen dispersed in the water phase, an emulsifying agent, and a non-thickening amount of molasses. No. 2,136,667. Ernest Julius Bert, Melbourne, Vict., Australia, to Shell Development Co., San Francisco, Calif.

Priming mixture adapted to ignite a propellant charge, comprising an initiator, a fuel, an oxidizing agent, and lead hypophosphite. No. 2,136,801. Jos. D. McNutt to Winchester Repeating Arms Co., both of New Haven, Conn.

Manufacture molded binder-reinforced fiber articles of pliant character. No. 2,136,826. Milton O. Schur to Brown Co., both of Berlin, N. H.

Lubricating oil, being solution of mineral oil in castor oil with an addition of triethanolamine as stabilizer. No. 2,136,846. Amato Furlotti, Milan, Italy.

Insecticide; a finely divided mixture, solidified from the molten state, of an insecticidal vegetable material and a carrier substance. No. 2,136,968. Albert B. Dorn, Hollywood, Calif., to Carus Chemical Co., A. G., all of Berlin, Germany.

Manufacture heat-resisting and electrically insulating articles; mixing magnesia mica with mixture containing silica, cryolite, boracic acid, and lead oxide. No. 2,136,877. Gaston Delpech, Clamart, and Roger Lambert, Levallois-Perret, France, to Societe Anonyme des Manufactures des Glaces & Produits Chimiques de Saint-Gobain, Chauny & Cirey, Paris, France.

Extreme pressure lubricant consisting of a mineral lubricating oil containing finely divided nigraniline. No. 2,136,885. Franz Rudolf Moser, Amsterdam, Netherlands, and Marinus Cornelis Tuyn, Pladjoe, Netherlands, East Indies, to Shell Development Co., San Francisco, Calif.

Manufacture metal-bonded abrasive articles; coating non-metallic abrasive particles with an amalgam, then mixing coated particles with a metal powder to form an abrasive mixture. No. 2,136,931. Raymond C. Benner and Geo. J. Easter to Carborundum Co., all of Niagara Falls, N. Y.

Method extinguishing fire in alcoholic material; covering burning material with foam produced by mixture of liquid and a compound selected from the group of high molecular quaternary ammonium, phosphonium and sulphonium compounds. No. 2,136,963. Heinrich Bertsch to Bohme Fettchemie G. m. b. H., both of Chemnitz, Germany.

U. S. Chemical Patents

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A rapidly acting photographic developer, comprising a salt of a primary aryl amine developer, a halogenated hydroquinone and a thiocyanate. No. 2,136,968. Albert B. Doran, Hollywood, Calif., to Carus Chemical Co., corp. of Ill.

Coating for blue print paper comprising a light-reducible ferric complex, a ferri-cyanide salt and a nitrate salt of an alkali metal of the first group of the periodic table. No. 2,137,015. Clyde A. Crowley and Geo. H. Goodyear to Huey Co., all of Chicago, Ill.

Fluorescent screen. No. 2,137,118. Arthur Schleede and Fritz Schroter to Telefunken Gesellschaft fur Drahtlose Telegraphie m. b. H., all of Berlin, Germany.

Material having lubricating and corrosion-resisting qualities, and suitable for use in contact with rubber; consisting of castor oil and a metal soap, also a basic substance capable of neutralizing the free fatty acids present in the oil. No. 2,137,147. Eric Rofe Styles, Minoco Wharf, West Silvertown, London, England, to Silvertown Lubricants, Ltd., London, England.

Manufacture impregnated and coated fibrous material. No. 2,137,155. Hermann Burmeister, Berlin-Spandau, Germany, to General Electric Co., corp. of New York.

Production a transparent, flexible, self-sustaining inherently adhesive starch base film, adapted as a protective covering for a book and the like, one face being capable of being moistened, the other face carrying a waterproofing film. No. 2,137,168. Harold Alvin Levey, New Orleans, La.

Production decorative spangles, comprising hard shiny flakes of a starch base, having self-sustaining film-forming properties. No. 2,137,170. Harold Alvin Levey, New Orleans, La.

Transparent, non-hygroscopic, self-sustaining thin sheet, consisting of naturally occurring water-soluble, chemically unchanged, vegetable carbohydrate gum; sheet adapted for use in wrapping articles. No. 2,137,171. Harold Alvin Levey, New Orleans, La.

Manufacture abrasive article, using a sintered bond composed of aluminum, and containing, in an aluminum base alloy, a hardening agent. No. 2,137,200. John A. Boyer to Carborundum Co., both of Niagara Falls, N. Y.

Manufacture abrasive article, having sintered metal matrix consisting of a ductile silver-base alloy which contains as a hardening agent at least one metal other than silver retained in solid solution. No. 2,137,201. John A. Boyer to Carborundum Co., both of Niagara Falls, N. Y.

Paper size; a dilute solution of ammonium resinate, made by mixing together pulverized rosin, water, and ammonia. No. 2,137,239. Judson A. De Cew, Mt. Vernon, N. Y.

Abrasive article comprising diamonds and a sintered metal bond consisting of a ductile copper base solid solution containing tin. No. 2,137,329. John A. Boyer to Carborundum Co., both of Niagara Falls, N. Y.

Production colored colloid layers for photographic purposes. No. 2,137,336. Bela Gaspar, Brussels, Belgium.

Manufacture a heat-resistant cotton yarn or cord; first saturating cotton yarns with latex. No. 2,137,339. Eugene C. Gwaltney to Bibb Mfg. Co., both of Macon, Ga.

Method protecting iron and steel structures against corrosion; preparing an aqueous zinc depositing paste by incorporating zinc oxide and monocalcium phosphate into an aqueous liquid; applying a coating of this paste to surface to be protected. No. 2,137,370. Theodor Broch Unger, Fredriksstad, Norway.

Anhydrous ink composition which has incorporated therewith a moisture responsive composition consisting of an anhydrous mixture of phenolphthalein and sodium carbonate. No. 2,137,463. Wm. H. Shields to Palm Bros. Decalcomania Co., both of Cincinnati, O.

Manufacture bonded and coated metallic articles. No. 2,137,464. Carl E. Swartz, Cleveland Heights, and John E. Wilkey, So. Euclid, O., to Cleveland Graphite Bronze Co., Cleveland, O.

An anhydrous lubricating grease comprising a lubricating oil and an oil-soluble soap of water-insoluble saponifiable materials, produced by partial liquid phase oxidation of slack wax. No. 2,137,494. Samuel Edw. Jolly, Prospect Park, Pa., and Wesley McIlveen McKee, deceased, late of Bortondale, Pa., by Anna McKee, administratrix, Media, Pa., to Sun Oil Co., Phila., Pa.

Production an inside frosted glass bulb; subjecting inside of a glass bulb to an etching solution made from water, ammonium bifluoride, solution of hydrofluoric acid, ammonium bicarbonate, and soda ash. No. 2,137,683. James J. Flaherty, Newark, N. J., to Wabash Appliance Corp., Brooklyn, N. Y.

Lubricating oil made from a hydrocarbon oil and a halogenated aliphatic alcohol. No. 2,137,777. Bert H. Lincoln and Waldo L. Steiner, Ponca City, Okla., and Alfred Henriksen, deceased, late of Ponca City, by John W. Wolfe, administrator, de bonis non, Ponca City, Okla., to Lubri Zol Development Corp., Cleveland, O.

Lubricating composition including a halogenated oxygen-bearing organic compound in a lubricating oil vehicle. No. 2,137,782. Carl F. Prutton, Cleveland, and Albert K. Smith, Shaker Heights, Ohio, to Lubri-Zol Development Corp., Cleveland, Ohio.

Lubricant including a halogen-bearing derivative of diphenyl ether in a lubricating oil vehicle. No. 2,137,783. Carl F. Prutton, East Cleveland, and Albert K. Smith, Shaker Heights, Ohio, to Lubri-Zol Development Corp., Cleveland, O.

Lubricant including a halogen-bearing ether in a lubricating oil vehicle. No. 2,137,784. Carl F. Prutton, Cleveland Heights, Ohio, and Albert K. Smith, Shaker Heights, Ohio, to Lubri-Zol Development Corp., Cleveland, Ohio.

Production synthetic product; subjecting mixture of an aromatic polycarboxylic acid and ethylene glycol to temperature of 130°C., continuing process till product is fusible and water-resistant. No. 2,137,993. Allen D. Whipple, Alexandria, Ind., to Mantle Lamp Co. of America, Chicago, Ill.

Production a highly transparent synthetic resin, introducing copper carbonate into mixture of phthalic anhydride and ethylene glycol, heating to temperature of 110 to 150°C., until resin is produced and said metal is incorporated therein. No. 2,137,994. Allen D. Whipple, Alexandria, Ind., to Mantle Lamp Co. of America, Chicago, Ill.

Production a resinous plasticizer, by subjecting phthalic anhydride and diethylene glycol to temperature of 130°C. until a desired condensation product is produced. No. 2,137,995. Allen D. Whipple, Alexandria, Ind., to Mantle Lamp Co. of America, Chicago, Ill.

Process stabilizing drier compositions; incorporating therewith a salt formed by reacting an organic nitrogen compound with an organic acid. No. 2,138,087. Paul E. Burchfield, Yeadon, Pa., to Harshaw Chemical Co., Elyria, Ohio.

Adhesive characterized by capacity for formation of a quick initial set and rapid drying to form a permanent bond. No. 2,138,137. Walter D. Bowlby to Hercules Powder Co., both of Wilmington, Del.

Sealing composition for waterless gas holders, comprising an extract obtained by means of a selective solvent from a natural petroleum oil, said extract being largely soluble in liquid sulfur dioxide. No. 2,138,158. Wm. Henry Hampton, and Theo. Wm. Doell, Berkeley, Calif., to Standard Oil Co. of Calif., San Francisco, Calif.

Durable granular material having thereon a coating of a compound of casein which is insoluble in water. No. 2,138,456. Arthur Dawes MacNutt, Kenmore, N. Y., to Certain-teed Products Corp., New York City.

Combined photographic developer and fixer for silver-halide-gelatine emulsions, comprising sodium thiosulfate, an organic developing agent, a caustic alkali, and a reducing sugar. No. 2,138,486. Ernest Fournes and Hans Diamant-Eerde, Vienna, Austria.

Insecticide having as an active ingredient a material from the class of rotenone and pyrethrum compositions, and a preservative. No. 2,138,516. Robt. L. Sibley, Nitro, W. Va., to Monsanto Chemical Co., St. Louis, Mo.

Insecticide containing, as its essential ingredient, copper sucrate. No. 2,138,557. Chas. C. Plummer, Mexico, D. F., Mexico; dedicated to free use of the Public in the Territory of the U. S. of America.

Water-free insecticidal spray, having as its principal toxic ingredient a hydroxy-alkyl ether of a phenol dissolved in a non-corrosive organic solvent. No. 2,133,972. Gerald H. Coleman and John W. Zemba to Dow Chemical Co., all of Midland, Mich.

Mothproofing agent. No. 2,134,001. Lindley E. Mills and Wm. Allen to Dow Chemical Co., all of Midland, Mich.

Adhesive consisting of an alkyd resin in solution in an organic solvent, a plasticizer, an oxidized drying or semi-drying oil, a crude caoutchouc in solution, and cyclohexane. No. 2,134,006. Harry C. Roller, Glendale, Calif.

Preservation felled green timber having its natural sap; impregnating same with a toxic and wood non-injuring aqueous solution, comprising a water soluble oxide of arsenic, and a water soluble ferro metallic salt. No. 2,134,031. Myron M. Clapshaw, Portland, Ore., to Mineralized-Cell Wood Preserving Co., corp. of Del.

Insecticidal spray oil made from a mineral oil and another oil. No. 2,134,136. Frank F. Lindstaedt, Oakland, Calif.

Insecticidal oil composition, the emulsifying component of which is in solution with the oil, consisting of petroleum sulfonic salts and an organic, oil-water interfacial tension depressant. No. 2,134,158. Wm. Hunter Volck, Watsonville, Calif., to California Spray-Chemical Corp., Berkeley, Calif.

Plasticized gamma polyvinyl chloride sealing ring as an oil seal on the shaft of a hydraulic shock absorber. No. 2,134,302. Fred L. Haushalter, Akron, O., to B. F. Goodrich Co., New York City.

Method lubricating bearings; using lubricant composed of a mineral hydrocarbon oil having incorporated therein beta naphthonitrile. No. 2,134,306. Arthur Walther Lewis, Elizabeth, N. J., to Tide Water Associated Oil Co., Bayonne, N. J.

Packing comprising small strands of fibrous material, each of which is impregnated with a heat treated binder, and also coated and partially impregnated with graphite. No. 2,134,324. Newell Brackett, Phila., Pa.

Production wax-like substances; subjecting mixture of aliphatic acyl compounds to a condensing-splitting treatment in the liquid phase in presence of a catalyst. No. 2,134,333. Michael Jahrstorfer, Mannheim, and Georg Schwarte, Ludwigshafen-am-Rhine, Germany, to I. G., Frankfort-am-Main, Germany.

Washing and cleansing composition, consisting of a water soluble sulfuric derivative of an aliphatic compound, containing at least 8 carbon atoms, and a water soluble salt of meta-phosphoric acid. No. 2,134,346. Fritz Siefert, Mannheim, Germany, to I. G., Frankfort-am-Main, Germany.

Method increasing tractive resistance of bituminous paving; coating a finely graded hard mineral aggregate or metal with bituminous material, and applying directly over bituminous paving during period of rolling. No. 2,134,357. Jos. H. Conzelman to Alabama Asphaltic Limestone Co., both of Birmingham, Ala.

Lubricant for bearing surfaces in internal combustion engines. Nos. 2,123,432-3. Troy Lee Cantrell and James Otho Turner, Lansdowne, Pa., to Gulf Oil Corp., Pittsburgh, Pa.

Lubricant for steam turbines. No. 2,134,435. Troy Lee Cantrell and James Otho Turner, Lansdowne, Pa., to Gulf Oil Corp., Pittsburgh, Pa.

An improved lubricant containing a mineral lubricating oil and an alkyl-phenyl oxy-ether of 2:4 dinitro benzene. No. 2,134,436. Troy Lee Cantrell and James Otho Turner, Lansdowne, Pa., to Gulf Oil Corp., Pittsburgh, Pa.

Solid insecticide comprising an addition compound of an alkyl ester of formic acid with an anhydrous alkali earth metal chloride, compound being decomposed by addition of water or moisture. No. 2,134,504. Karl Broderson and Matthias Quadvlieg, Dessau in Anhalt, Germany, to Winthrop Chemical Co., New York City.

Insecticidal composition containing as a toxic ingredient a nitro substituted diphenyl oxide. No. 2,134,556. Wm. F. Hester, Drexel Hill, Pa. to Rohm and Haas Co., Phila., Pa.

Method and means of simultaneous cleansing and lubricating of typewriters, using spray composed of a mineral hydrocarbon lubricant, a mineral hydrocarbon solvent, and a volatile non-inflammable chlorinated hydrocarbon. No. 2,134,602. Jacob M. Cohen, Washington, D. C.

Lubricating oil comprising mixture of a petroleum lubricating oil with a higher saturated fatty acid ester of mannitol. No. 2,138,771. Ernest F. Pevere, Beacon, N. Y., to Texas Co., New York City.

Manufacture synthetic lubricating oil. No. 2,138,775. Chas. C. Towne, Beacon, N. Y., to Texas Co., New York City.

Abrasive comprising a fusion product of garnet, kaolin, and a flux. No. 2,138,799. Chas. R. Walker to Abrasive Products, Inc., both of So. Braintree, Mass.

Germicidal detergent composition comprising buffer salts, soap, and azochloramid, said solution being soluble in water. No. 2,138,806. Halvor O. Halvorson and John L. Wilson, St. Paul, Minn., and Erling J. Ordal, Minneapolis, Minn., to Economics Lab., Inc., St. Paul, Minn.

Germicidal detergent composition in form of a dry mixture of buffer salts, soaps, and the sodium salt of a phenyl phenol. No. 2,138,805. Halvor O. Halvorson and John L. Wilson, St. Paul, Minn., and Milward Bayliss, Minneapolis, Minn., to Economics Lab., Inc., St. Paul, Minn.

Lubricating oil comprising a mineral oil deficient in oiliness, and a residue obtained by exhaustively extracting a Pennsylvania residuum with a solvent. No. 2,139,668. Ferdinand W. Breth, New York City, and Anton Kinsel, Petrolia, Pa., to L. Sonneborn Sons, Inc., corp. of Del.

Lubricating oil for bearings having corrosion susceptibility; comprising a mineral hydrocarbon oil having incorporated therein triphenyl arsine sulfide. No. 2,139,725. Elmer Wm. Cook, New York City, to Tide Water Associated Oil Co., Bayonne, N. J.

Lubricating oil for bearings having corrosion susceptibility, comprising mineral hydrocarbon oil having incorporated therein p-ethoxy phenyl

morpholine. No. 2,139,726. Elmer Wm. Cook, New York City, to Tide Water Associated Oil Co., Bayonne, N. J.

Manufacture abrasive article. No. 20,946. Reissue. Richard P. Carlton, St. Paul, Minn., to Strathmore Co., Cleveland, O.

Aqueous impregnating solution for wood, etc. No. 2,139,747. Bror Olaf Hager, to Bolidens Gruvaktiebalog, both of Stockholm, Sweden.

Lubricant for bearings having corrosion susceptibility, composed of mineral hydrocarbon oil having incorporated therewith thio benzanilide. No. 2,139,758. Arthur Walther Lewis, Elizabeth, N. J., to Tide Water Associated Oil Co., Bayonne, N. J.

Mineral lubricating oil containing a dialkyl diphenol sulfide, having an aryl group of 4 or 5 carbon atoms, to increase the stability of the oil to oxidation. No. 2,139,766. Louis A. Mikeska and Chas. A. Cohen, Elizabeth, N. J., to Standard Oil Development Co., corp. of Del.

Photographic developer comprising a pyrimidine substituted in the 2.5-positions by a group selected from amino-groups, alkylamino-groups, and hydroxy-groups, and an alkaline reacting substance. No. 2,139,870. Gustav Wilmanns, and Hans Fricke, Wolfen, and Emil Joachim Birr, Bitterfeld, Germany, to Agfa Ansco Corp., Binghamton, N. Y.

Dielectric liquids for electrical apparatus. Nos. 2,139,946-7-8. James G. Ford, Forest Hills, and Chas. F. Hill, Edgewood, Pa., to Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

Dielectric liquid comprising nucleus chlorinated ethylbenzene containing at least 3 carbon atoms of chlorine per mol. of ethylbenzene. No. 2,139,964. Arthur A. Levine and Oliver W. Cass, Niagara Falls, N. Y., to du Pont, Wilmington, Del.

Coal Tar Chemicals

Manufacture pyrazole-anthrones. No. 2,136,133. Hermann Hauser, Binningen, and Max Bommer, Riehen, Switzerland, to Society of Chemical Industry in Basle, Basel, Switzerland.

Production pseudo azimido-benzene-amino-acyloacetic acid esters. No. 2,136,135. Hans Johner and Gerald Bonhote to Society of Chemical Industry in Basle, all of Basel, Switzerland.

Nitration of para cresol to form meta nitro para cresol. No. 2,136,187. Robert Frye and Grady M. O'Neal, Chicago, Ill., to Sherwin-Williams Co., Cleveland, Ohio.

Conversion liquid pitch into a fragmentary, transportable form. No. 2,136,208. Karl Fehr, Erwin Heinemann, and Wilhelm Schneider, Rauxel, Westphalia, Germany, to Rutgerswerke Aktiengesellschaft, Berlin, Germany.

Preparation 2-Bz-1'-dibenzanthronyl; heating 2-benzanthroneacrylic acid with methyleneanthrone in an organic solvent in presence of a mild oxidizing agent. No. 2,136,998. Clarence F. Belcher, So. Milwaukee, Wis., to du Pont, Wilmington, Del.

Diamides of organic dicarboxylic acids. No. 2,137,287. Heinrich Hopff and Helmut Ohlinger, Ludwigshafen-am-Rhine, Germany, to General Aniline Works, New York City.

Production nitrogenous condensation products; heating an amino substitution product of a polynuclear compound of the anthraquinone series with a carboxylic acid in presence of an acid condensing agent. No. 2,137,295. Karl Koeberle, Ludwigshafen-am-Rhine, Germany, to General Aniline Works, Inc., New York City.

Separation of phenols. No. 2,137,587. Noland Poffenberger to Dow Chemical Co., both of Midland, Mich.

Production onium-methyl benzenes, useful for improving fastness of dyeings. No. 2,138,113. Ferdinand Munz, Frankfort-am-Main, and Karl Keller and Otto Trosken, Frankfort-am-Main-Fechenheim, Germany, to General Aniline Works, New York City.

Production compounds of the anthrapyridine and anthrapyrimidine series. No. 2,138,381. Karl Koeberle and Christian Steigerwald, Ludwigshafen-am-Rhine, Germany, to General Aniline Works, New York City.

Purification crude hydrocarbons, more particularly crude benzole, crude benzine, and crack benzine. No. 2,134,241. Karl Susselbeck, Oberhausen-Sterkrade, Germany, to Gutehoffnungshutte Oberhausen Aktiengesellschaft, Oberhausen-Rheinland, Germany.

Purification maleic anhydride resulting from vapor phase catalytic oxidation of a maleogenetic substance; subjecting same to action of an acidifying agent. No. 2,134,531. Elton B. Punnett, Buffalo, N. Y., to National Aniline & Chemical Co., New York City.

Method catalytically hydrogenating coumarone-indene resins. No. 2,139,722. Wm. H. Carmody to Neville Co., both of Pittsburgh, Pa.

Production thiocyanic and dithiocarbamic anhydrides. No. 2,139,935. Jean Claudin to Societe Anonyme des Matieres Colorantes & Produits Chimiques de Saint-Denis, both of Paris, France.

Coatings

Method forming laminated metal; passing a base metal through a bath of molten coating metal. No. 2,135,652. Marshall G. Whitfield and Victor Sheshunoff, Knoxville, Tenn., to Reynolds Metal Co., New York City.

Process and apparatus for producing metallic coatings on various articles. No. 2,136,024. Hans Schneider, Port Chester, N. Y., to Metal Forming & Coating, Inc., corp. of New York.

Coating composition comprising a pigment having deposited thereon a dispersion control agent. No. 2,136,313. Gordon Derby Patterson to du Pont, both of Wilmington, Del.

Cold tinning compound made from mixture of metallic mercury, a salt containing mercury and chlorine, another salt, and a stabilizer. No. 2,136,496. Newell M. Epperson to Taywal, Ltd., both of Chattanooga, Tenn.

Composition of matter comprising a film-forming material, soluble in organic solvents, and a plasticizer. No. 2,136,499. Walter E. Gloor, South River, N. J., to Hercules Powder Co., Wilmington, Del.

Transparent composite sheet material comprising a flexible casein sheet enveloped in a thin coating of rubber hydrochloride. No. 2,136,544 Erich Gebauer-Fuelnegg, deceased, late of Evanston, Ill., by Marie Gebauer-Fuelnegg, Evanston, Ill., administratrix, and Eugene W. Moffett, Pittsburgh, Pa., and Eduoard M. Kratz, Chicago, Ill., to Marbon Corp., Gary, Ind.

A standard electrolytic zinc plating solution; being an aqueous solution of zinc cyanide, sodium cyanide, sodium hydroxide, gum arabic, sodium fluoride, and a lead salt. No. 2,136,629. Sumner R. Mason, Wilmette, Ill., to Western Electric Co., New York City.

Film coating for metallic pipes. No. 2,136,681. Karl H. Fulton and John L. Illig, Pittsburgh, Pa., to Ball Chemical Co., corp. of Pa.

Protective coating. No. 2,137,084. Clarence L. Hauthaway, Newton, Mass.

Moisture permeable transparent film cast from an aqueous cellulosic solution. No. 2,137,274. Donald E. Drew, Kenmore, N. Y., to du Pont, Wilmington, Del.

Production a flexible, transparent, moisture-proof, heat sealable film; a non-fibrous cellulosic base coated with a composition comprising a wax material and a film-forming component. No. 2,137,636. Harold J. Barrett to du Pont, both of Wilmington, Del.

Protective coating composition having as an ingredient the product of the simultaneous reaction of a hydrogenated rosin ester, a drying oil, and an unmodified, oil-soluble resin of the phenol-formaldehyde type. No. 2,138,140. Irwin C. Clare to Hercules Powder Co., both of Wilmington, Del.

Protective coating composition including a volatile solvent and a polymerized rosin ester, characterized by a viscosity and a molecular weight higher than the corresponding unemployed rosin ester. No. 2,138,211. Paul Schnorf, Wiesli, Switzerland, to Hercules Powder Co., Wilmington, Del.

Composite surfacing material. No. 2,138,734. Albert Ernest Horatio Dussek, Bromley, England.

Production photographic colored images; color developing an image in a silver halide emulsion layer which has been exposed, removing developed silver, then treating colored image-carrying layer in an aqueous solution containing not over 4 per cent. phenol. No. 2,134,266. Edgar Sanders-Dolgoruki and John Hubert Reindorp to Truecolour Film, Ltd., all of London, England.

Antistatic photographic film; transparent film support, consisting of a material having a cellulose nucleus, a coating over support of a polymeric amino-nitrogen containing an organic compound. No. 2,139,689. Martin Marasco, Parlin, and Edmund B. Middleton, New Brunswick, N. J., to Du Pont Film Mfg. Co., New York City.

Buffered photographic film; buffered to a hydrogen ion concentration approximately the same as that of the emulsion used. No. 2,139,767. Gale F. Nadeau, Rochester, N. Y., to Eastman Kodak Co., Jersey City, N. J.

Sensitizing and hardening photographic emulsions. No. 2,139,774. Samuel E. Sheppard, Robt. C. Houck, and Raymond H. Lambert, Rochester, N. Y., to Eastman Kodak Co., Jersey City, N. J.

Photographic element, comprising a support carrying a photographic emulsion layer and an anti-static layer comprising a tauride containing sulfonic derivative radicals. No. 2,139,778. Alfred D. Slack and Albert A. Young to Eastman Kodak Co., all of Rochester, N. Y.

Colored metallic finish. No. 2,139,824. Dale Glendon Higgins, Newburgh, N. Y., to du Pont, Wilmington, Del.

Liquid composition suitable for coating and like purposes; solution of a rubber hydrohalide containing sulfur in intimate admixture therewith No. 2,139,992. Herbert A. Winkelmann and Eugene W. Moffett to Marbon Corp., all of Chicago, Ill.

Dyes, Stains, Etc.

Method dyeing cellulosic materials; by direct application of unreduced sulfonic acids of phthalocyanines. No. 2,135,633. Berthold Bienert, Leverkusen-I. G. Werk, and Karl Holzach, Ludwigshafen-am-Rhine, Germany, to General Aniline Works, New York City.

Production azo dyestuffs. No. 2,135,964. Miles A. Dahlen, Wilmington, and Frithjof Zwilgmeyer, Arden, Del., to du Pont, Wilmington, Del.

Production monoazo compounds. No. 2,135,965. Miles A. Dahlen, Wilmington, and Frithjof Zwilgmeyer, Arden, Del., to du Pont, Wilmington, Del.

Preparation sulfur colors from dyestuff intermediates that are thionated to produce dyes by means of thionating agents. Nos. 2,136,016-17. Simon Norman, Providence, R. I., to Industrial Dyestuff Co., East Providence, R. I.

Production dyestuffs. No. 2,136,136. Hans Johner and Gerald Bonhote to Society of Chemical Industry in Basle, all of Basel, Switzerland.

Preparation disazo dyestuffs, distinguished by their brightness of shade and an excellent fastness towards sublimation, especially in copper plate printing. No. 2,136,138. Adolf Krebser, Riehen, near Basel, Switzerland, to J. R. Geigy, A. G., Basel, Switzerland.

Production anthraquinone-naphthacridone dyestuff. No. 2,136,146. Wilhelm Moser, Riehen, and Walter Fioroni, Binningen, Switzerland, to Society of Chemical Industry in Basle, Basel, Switzerland.

Production azo dyestuffs. No. 2,136,300. Johann Heinrich Helberger, Cologne-Mulheim and Heinrich Ohlendorf, Dessau, Germany, to General Aniline Works, New York City.

Production colored cellulose azo compounds. No. 2,136,377. Ralph Dinklage, New York City.

Preparation reduction product of a thioindigo dye; reducing dye in a reaction medium consisting of an alkali metal hydrosulfite and water. No. 2,136,427. Arthur L. Fox to du Pont, both of Wilmington, Del.

Preparation reduction products of thionaphthene indolindigoid dyes. No. 2,136,428. Arthur Lawrence Fox, Woodstown, N. J., to du Pont, Wilmington, Del.

Production dyestuffs of the safranine series. No. 2,136,507. Eugen Huber and Wolfram Vogt, Leverkusen-I. G. Werk, Germany, to General Aniline Works, New York City.

Production metallized acid polyazo dyes. No. 2,136,650. Moses L. Crossley, Plainfield, and Lincoln Maurice Shafer, Highland Park, N. J., to Calco Chemical Co., Bound Brook, N. J.

Production disazo dyestuffs. No. 2,137,498. Henry Mirocourt, Sotteville-les-Rouen, and Marcel Georges Jirou, Rouen, France, to Compagnie Nationale Matieres Colorantes et Manufactures de Produits Chimiques du Nord Reunies Etablissements Kuhlmann, Paris, France.

Dye stain composition comprising a solution saturated with a staining dye of methanol, urea, formamide, ammonium formate, methanol, and alkali nitrite. No. 2,137,830. Julius F. T. Berliner to du Pont, both of Wilmington, Del.

Dye stain composition comprising solution of methanol and urea, saturated with a staining dye. No. 2,137,871. Julius F. T. Berliner to du Pont, both of Wilmington, Del.

Production polymethine dyes. No. 2,138,223. Gustav Wilmanns, Wolfen, Kreis Bitterfeld, and Wilhelm Schneider, Dessau, Germany, to Agfa Ansco Corp., Binghamton, N. Y.

Preparation diazo compounds from amines. No. 2,138,559. Fritz Straub and Peter Pieth, Basel, and Hermann Schneider, Riehen, Switzerland, to Society of Chemical Industry in Basle, Basel, Switzerland.

A hydrous alkaline dyeing composition. No. 2,138,572. Robt. E. Etzelmiller, So. Milwaukee, Wis., to du Pont, Wilmington, Del.

Production pyrazolone azo dyestuffs. No. 2,134,035. Geo. Holland Ellis, Spondon, near Derby, England, to Celanese Corp. of America, corp. of Del.

Production monoazo dyestuffs. No. 2,134,038. Richard Fleischhauer,

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Frankfort-am-Main-Fechenheim, Germany, to General Aniline Works, Inc., New York City.
Production mordant azo dyestuffs. No. 2,134,453. Max Muller and Roger Ratti, to Durand & Huguenin S. A., both of Basel, Switzerland.
Production dyestuff-sulfonic acids of the dioxazine series. No. 2,134,505. Arnold Brunner, Heinrich Greune, Max Thiele, and Karl Thiess, Frankfort-am-Main, Germany, to General Aniline Works, New York City.
Production azo dyestuffs. No. 2,134,521. Arthur Howard Knight, Blackley, Manchester, England, to Imperial Chemical Industries, corp. of Great Britain.
Production azo dyestuff. No. 2,134,642. Pierre Petitcolas, Rouen, and Robert Frederic Michel Sureau, Mont St.-Aignan, France, to Compagnie Nationale de Matieres Colorantes et Manufacturers de Produits Chimiques du Nord Reunies, Etablissements Kuhlmann, Paris, France.
Production compounds of the anthraquinone series. No. 2,134,654. Ralph N. Lulek, Milwaukee, Wis., to du Pont, Wilmington, Del.
Production dyestuffs of the anthracene series. No. 2,138,759. Wilhelm Eckert and Otto Braunsdorf, Frankfort-am-Main-Hochst, to General Aniline Works, New York City.
Dyeing and printing with insoluble azo dyestuffs. No. 2,139,987. Andre Wahl, Enghien, and Maurice Paillard, Paris, France, two-thirds to Societe Anonyme des Matieres Colorantes Produits Chimiques de Saint-Denis, Paris, France.

Explosives

Manufacture blasting powder, comprising loose mass of pellets having a sodium nitrate center coated with a viscous film of an explosive nitric ester liquefiable at moderate temperature, forming a binder holding an outer layer of an intimate mixture of a finely divided explosive, including a nitrate salt, a perchlorate, and an easily oxidizable metal. No. 2,136,205. Laud S. Byers, Glendale, Calif.
Purification deteriorated trinitrotoluene; contacting molten but undissolved trinitrotoluene with an acid mixture of sulfuric acid, nitric acid and water. No. 20,926. Reissue. Jos. A. Wyler, Allentown, Pa., to Trojan Powder Co., corp. of New York.
Manufacture salts of styphnic acid; sulfonating and nitrating resorcine to styphnic acid, and subsequent formation of a crystalline salt, adding trioxymethylene during preparation of the acid. No. 2,137,234. Willi Brun, Bridgeport, Conn., to Remington Arms Co., corp. of Del.
Primer for a high explosive charge comprising a solid detonating explosive. No. 2,138,581. Wm. E. Kirst, Woodbury, N. J., to du Pont, Wilmington, Del.

Fine Chemicals

Flexible photographic film, comprising a cellulose organic derivative support and, in order, a synthetic resin layer, a layer of partially oxidized cellulose acetate, and a photographic emulsion layer. No. 2,135,524. Gale F. Nadeau to Eastman Kodak Co., both of Rochester, N. Y.
Preparation aromatic mercury sulfonamides in which the aromatic mercury radical is linked to a sulfonamido group. No. 2,135,553. Carl N. Andersen, Wellesley Hills, Mass., to Lever Bros. Co., corp. of Me.
Condensation process; in first step adding sulfuric acid to a mercuric salt solution to yield a precipitate of mercuric acid. No. 2,136,217. Walter Mitchell, Norton-on-Tees, England, to Imperial Chemical Industries, corp. of Great Britain.
Preparation divinyl ether by treating a β, β'-dihaloethyl ether with an alkali-metal alcoholate dissolved in the corresponding alcohol. No. 2,136,387. Wm. A. Lott, East Orange, N. J., to E. R. Squibb & Sons, New York City.
Manufacture 2, 4-dioxo-3, 3-dialkyl-6-methyl-tetrahydro-puridine. No. 2,137,192. Otto Schnider, Basel, Switzerland, to Hoffmann LaRoche, Nutley, N. J.
Hydroxy-ethoxy derivatives of 2-phenylquinoline-4-carboxylic acid. No. 2,138,628. Paul Diedrich, Finkenkrug, Germany, to Schering-Kahlbaum A. G., Berlin, Germany.

Glass and Ceramics

Glass composition made from SiO_2, B_2O_3, Al_2O_3, CaO, BaO. No. 2,135,663. Walter Hanlein, Berlin-Haselhorst, and Hermann Krefft, Berlin-Friedrichshagen, Germany, to General Electric Co., corp. of New York.
Laminated glass comprising sheet of glass and bonded thereto an interlayer sheet composed of cellulose nitrate, and a plasticizer composition. No. 2,136,436. John W. Haught, Arlington, N. J., to du Pont, Wilmington, Del.
Non-shatterable laminated glass; comprising a plurality of sheets of glass having as the interposed strengthening layer a material consisting of a polymer of at least one ester containing a vinyl group, and a cellulose ester. No. 2,137,377. Walter Bauer and Paul Weisert, Darmstadt, Germany, to Rohm & Haas, Phila., Pa.

Industrial Chemicals, etc.

Process separating elemental phosphorus from impurities. No. 2,135,486. Lawrence H. Almond, Nashville, Tenn.
Utilization of colliery shale and other waste bituminous shales in the manufacture of cementitious products. No. 2,135,542. Norman Victor Sydney Knibbs, Westwood, New Barn, Longfield, and Alfred Petter Pehrson, Streatham, London, England, to Continental Investment Syndicate, Ltd., London, England.
Electrolytic production of ammonium perphosphate in solid form. No. 2,135,545. Walter Voelkel to Deutsche Gold und Silber Scheideanstalt vormals Roessler, both of Frankfort-am-Main, Germany.
Removal mud sheaths from geological formations penetrated during drilling of wells, by application of a stable aqueous dispersion. No. 2,135,589. Louis T. Monson, Alhambra, Calif., to Tretolite Co., Webster Groves, Mo.
Separation of solid particles or crystals of sodium carbonate from mixture thereof with an aqueous solution containing sodium carbonate and caustic alkali. No. 2,135,605. John Stuart Stevenson, Buffalo, N. Y., to National Aniline & Chemical Co., New York City.
Preparation esters of C-dialkylglycines. No. 2,135,641. Ralph Albert Jacobson to du Pont, both of Wilmington, Del.
Electric gaseous discharge device, comprising a sealed envelope having a gaseous atmosphere, including a metal vapor therein, portion of envelope exposed to said discharge having following composition: SiO_2, B_2O_3, Al_2O_3, CaO, BaO. No. 2,135,662. Walter Hanlein, Berlin-Haselhorst, and Hermann Krefft, Berlin-Friedrichshagen, Germany, to General Electric Co., corp. of New York.
Manufacture hydrochloric acid and sodium sulfate by reacting with sulfuric acid upon rock salt. No. 2,135,674. Hans Oehlert, Krefeld-Uerdingen, Germany, to I. G., Frankfort-am-Main, Germany.
Production hydrogen gas. No. 2,135,693. Dwight C. Bardwell and Frank Porter, Syracuse, N. Y., to Solvay Process Co., New York City.
Production of a nitrogen-hydrogen gas. No. 2,135,694. Dwight C. Bardwell and Frank Porter, Syracuse, N. Y., to Solvay Process Co., New York City.
Process obtaining a mixture of nitrogen and hydrogen in determined proportions, by the dissociation of hydrocarbon gases and vapors. No. 2,135,695. Dwight C. Bardwell, Syracuse, N. Y., to Solvay Process Co., New York City.
Production acetic pyruvic anhydride. No. 2,135,709. Geo. DeWitt Graves to du Pont, both of Wilmington, Del.
Production nitric acid. No. 2,135,733. Ralph S. Richardson, Scarsdale, N. Y., to Chemical Construction Corp., corp. of Del.
Catalytic oxidation of hydrosulfide solutions to pentasulfide by means of an oxygen containing gas and water insoluble multivalent metal sulfide catalyst. No. 2,135,879. Wm. H. Shiffler and Melvin H. Holm, Berkeley, Calif., to Standard Oil Co. of Calif., San Francisco, Calif.
Removal mud sheaths from well bores; subjecting sheaths to action of a stable aqueous emulsion of the oil-in-water type. No. 2,135,909. Louis T. Monson, Alhambra, Calif., to Tretolite Co., Webster Groves, Mo.
Method imparting improved drying properties to oil. No. 2,135,976. Walter J. Koenig, Phila., Pa., to Sloane-Blabon Corp., Trenton, N. J.
Production sulfonated alkylated diphenyl compounds and salts thereof. No. 2,135,978. Geo. L. Magoun, Nitro, W. Va., to Monsanto Chemical Co., St. Louis, Mo.
Production dicarboxylic acid ester of a terpene alcohol, which includes esterifying a terpene alcohol while avoiding oxidation in the reaction mass. No. 2,136,000. Jos. N. Borglin to Hercules Powder Co., both of Wilmington, Del.
Terpene ether produced from an unsaturated terpene compound by the addition of a polyhydric alcohol to a double bond of an unsaturated terpenic group contained in the terpene compound. No. 2,136,011. Irvin W. Humphrey to Hercules Powder Co., both of Wilmington, Del.
Preparation 2, 3, 6-triamino-pyridine. No. 2,136,044. Max Engelmann to du Pont, both of Wilmington, Del.
Method cleaning slush culm. No. 2,136,074. Bruce D. Crawford, Cedar Grove, N. J., and Harry A. Grine, Chestertown, Md.
Preparation piperazine; heating liquid mixture containing free diethylene triamine in presence of one of its partial hydrochlorides, and distilling piperazine from mixture. No. 2,136,094. Alex. L. Wilson, Pittsburgh, Pa., to Carbide & Carbon Chemicals Corp., New York City.
Manufacture boron carbide; first forming mix of boric oxide and carbon. No. 2,136,107. Henry P. Kirchner and Raymond C. Benner to Carborundum Co., all of Niagara Falls, N. Y.
Catalytic oxidation of naphthenes. No. 2,136,144. Nicholas A. Milas, Belmont, Mass., and Wm. L. Walsh, East Greenbush, N. Y., to Research Corp., New York City.
Production polar adsorbent; treating a coal with strong sulfuric acid. No. 2,136,167. Eric Berkeley Higgins, Punchetts, Twein Wood, England.
Manufacture halogen alkylamine; treating the hydrogen halide salt of a hydroxyalkylamine with gaseous hydrogen halide while distilling off water during reaction. No. 2,136,171. Walter Maier, Jessnitz, Germany, to I. G., Frankfort-am-Main, Germany.
Stable preparations comprising solutions of halogenamides in chlorinated compounds. No. 2,136,173. Friedrich-Arnold Steingroever and Otto Josef Boser, Dresden, Germany, to Chemische Fabrik von Heyden, A. G., Radebeul, near Dresden, Germany.
Preparation unsaturated amines. No. 2,136,177. Wallace H. Carothers and Gerard J. Berchet to du Pont, all of Wilmington, Del.
Preparation unsaturated aliphatic compounds; reacting halogen-4-butadiene-1, 2 with an alkaline reacting metal inorganic compound. No 2,136,178. Wallace H. Carothers and Gerard J. Berchet to du Pont, all of Wilmington, Del.
Production an alkylene oxide; subjecting a fatty acid ester to the action of heat in presence of a basic reagent and not more than one mol. water per mol. of ester. No. 2,136,183. Henry Dreyfus, London, England.
Manufacture plastic masses; composition comprising chlorinated rubber and the product obtained by reacting, in presence of a Friedel-Crafts reagent catalyst, an aromatic hydrocarbon, having at least one halogen atom attached to a nuclear carbon atom with a hydrocarbon having at least one halogen atom attached to an acyclic carbon atom. No. 2,136,270. Nicholas Bennett, Widnes, England, to Imperial Chemical Industries, corp. of Great Britain.
Manufacture sulfuric acid by the contact process. No. 2,136,298. Chas. Frederick Reed Harrison, Arthur Maurice Clark, and Chas. Lacy Hilton, Norton-on-Tees, to Imperial Chemical Industries, corp. of Great Britain.
Stabilization of vinylidene chloride. No. 2,136,333. Gerald H. Coleman and John W. Zemba to Dow Chemical Co., all of Midland, Mich.
Method of and compounds for controlling polymerization of vinylidene chloride. No. 2,136,334. Gerald H. Coleman and John W. Zemba to Dow Chemical Co., all of Midland, Mich.
Method cleaning refuse coal, subjecting same to a froth flotation process with a reagent. No. 2,136,341. Norman Hedley, Westfield, N. J., to American Cyanamid Co., New York City.
Stabilizing vinylidene chloride; composition comprising monomeric vinylidene chloride and sufficient iodine to impart stability. No. 2,136,347. Ralph M. Wiley to Dow Chemical Co., both of Midland, Mich.
Stabilization vinylidene chloride. Nos. 2,136,348-9. Ralph M. Wiley to Dow Chemical Co., both of Midland, Mich.
Preparation sulfuric acid derivative of a fatty acid diester of a glycol. No. 2,136,379. Lawrence H. Flett, Hamburg, N. Y., to National Aniline & Chemical Corp., New York City.
Catalytic conversion of hydrocarbons. No. 2,136,382. Eugene J. Houdry, Rosemont, Pa., to Houdry Process Corp., Dover, Del.
Refrigerating composition comprising water and urea, ingredients being present in proportions to give a solution having a eutectic freezing point. No. 2,136,385. Young Kaufman, New York City, and Victor K. La Mer, Leonia, N. J., La Mer assignor to Kaufman.
Process reacting sulfur dioxide, in presence of aqueous hydrogen peroxide, with an olefinic compound. No. 2,136,389. Carl Shipp Marvel, Urbana, Ill., and Donald Sherwood Frederick, Drexel Hill Plaza, Pa., Frederick assignor to Marvel.
Manufacture catalyst pellets, mixing a finely divided reducible oxide of a catalytic metal with another metal in finely divided form. No. 2,136,509. Leslie G. Jenness, Brooklyn, N. Y.
In an ozonizer, an electrical assembly comprising at least 2 electrodes having a dielectric composed of a rubber hydrochloride. No. 2,136,572. Herbert A. Winkelmann and Albert Baird Fridaker, Chicago, Ill., to Marbon Corp., corp. of Del.
Manufacture compound agglomerate containing fuel. No. 2,136,591. Roy G. McPherson, Framingham, Mass.

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Manufacture esters, especially of ethyl acetate. No. 2,136,613. Henri Martin Guinot, Niort, Deux-Sevres, France, to Usines de Melle, Melle, France.

Hydrogenation of soya bean oil. No. 2,136,653. Harold E. Moore and Ralph B. Vogel, to Capital City Products Co., all of Columbus, O.

Treatment of oils. No. 2,136,774. Kenneth C. D. Hickman to Distillation Products, Inc., both of Rochester, N. Y.

Non-yellowing composition, using molybdenum trioxide in process. No. 2,136,782. Edmond H. Bucy, Stamford, Conn., to Atlas Powder Co., Wilmington, Del.

Working fluid for absorption refrigerating machines; refrigerant being a member of the group of ethers and esters, said compounds having B. P. below 65°C., and as an absorbent a mixture of simple phenols having a freezing point below 25°C. No. 2,136,791. Jos. Fleischer, East Alton, Ill., to Servel, Inc., New York City.

Manufacture molded, binder-reinforced, airlaid fiber articles. No. 2,136,827. Milton O. Schur to Brown Co., both of Berlin, N. H.

Method drying and treating wet granular materials. No. 2,136,870. Gustave Andre Vissac, Calgary, Alta., Canada.

Production a resinous amine rich in nitrogen. No. 2,136,928. Paul Schlack, Berlin-Treptow, Germany, to I. G., Frankfort-am-Main, Germany.

Method distilling a quinone. No. 2,136,966. Alwin A. Carus, LaSalle, Ill., to Carus Chemical Co., corp. of Ill.

Method of and apparatus for production mineral wool from molten slag. No. 2,136,988. Clarence B. White, Phila., Pa.

Manufacture calcium nitrate from ammoniacal gases, resulting from distillation and gasification of fuels and similar ammoniacal gases. No. 2,136,994. Harry Pauling, Berlin, Germany.

Decomposition of complex sulfate salts containing alkali sulfates and alkaline earth sulfates. No. 2,136,996. Erich Wiedbraucks, Hans Schrader, and Karl Buche, Essen-Ruhr, Germany, to Th. Goldschmidt A. G., all of Essen-Ruhr, Germany.

Manufacture an albuminous artificial product containing as a softening agent, cyclohexanone glycerol. No. 2,137,006. Walther Schrauth, Berlin-Dahlem, Germany, to Deutsche Hydrierwerke Aktiengesellschaft, Berlin-Charlottenburg, Germany.

Preparation dissolving, softening, gelatinizing, and swelling agents. No. 2,137,007. Walther Schrauth, Berlin-Dahlem, and Kurt Stickdorn, Rosslau, Anhalt, Germany, to Deutsche Hydrierwerke Aktiengesellschaft, Berlin-Charlottenburg, Germany.

Production crystalline boric oxide. No. 2,137,058. Leon McCulloch, Pittsburgh, Pa., to Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

Method removing free chlorine impurity from hydrogen chloride; contacting mixture in gaseous form with a liquid cracked petroleum oil containing unsaturated hydrocarbons. No. 2,137,095. Edw. B. Peck, Elizabeth, N. J., to Standard Oil Development Co., corp. of Del.

Preparation catalysts for hydrogen production, by reaction of hydrocarbon and steam. No. 2,137,101. Wm. E. Spicer, Baton Rouge, La., to Standard Oil Development Co., corp. of Del.

Production material possessing essential properties of plastic flow under heat and pressure; treating air-dry vegetable fibrous material with chlorine, adding aniline in a later step in process. No. 2,137,119. Earl C. Sherrard, Edw. Beglinger, and John P. Hohf, Madison, Wis., and Ernest Bateman, deceased, late of Madison, Wis., by Wm. Bateman, Madison, Wis., special administrator, to Henry A. Wallace, Sec'y of Agriculture of U. S.

Manufacture sulfonated coeruleins by treating a reduced gallein with an agent having dehydrating and sulfonating properties. No. 2,137,143. Eduard Peyer to Durand & Huguenin S. A., both of Basel, Switzerland.

Production metal carbides. No. 2,137,144. Nicolas Sainderichin, Paris, France, to Follsain Syndicate, Ltd., London, England.

Mineral oil composition composed of a hydrocarbon oil containing unsaturates and a compound having formula OH-R-N-R', where R is phenylene and R' is a member of the group consisting of a cyclohexylidene and an anthronidene radical. No. 2,137,175. Geo. D. Martin, Nitro, W. Va., to Monsanto Chemical Co., St. Louis, Mo.

Improved method for cold drawing shaped articles derived from fiber-forming synthetic polymers; wetting articles with a hydroxylated non-solvent for the polymer, then applying stress to effect cold drawing. No. 2,137,235. Wallace H. Carothers to du Pont, both of Wilmington, Del.

Manufacture phthalic di-diethylamide, reacting phthalyl dichloride with diethylamine in an aqueous solution, and salting out phthalic di-diethylamide. No. 2,137,279. Felix Haffner, Tubingen, and Fritz Sommer, Berlin, Germany, to Chemische Fabrik Grunau, Landshoff & Meyer, A. G., Berlin-Grunau, Germany.

Manufacture bimetallic elements. No. 2,137,309. Theo. J. Smulski to Anderson Co., both of Gary, Ind.

Process and apparatus for recovery of sulfur dioxide from sulfite liquors. No. 2,137,311. Karl L. Springer, Goose Creek, Tex., to Standard Oil Development Co., corp. of Del.

Production quaternary ammonium compounds; the tetraethanolammonium salt of the acid octodecyl sulfuric ester. No. 2,137,314. Heinrich Ulrich and Ernst Ploetz, Ludwigshafen-am-Rhine, Germany, to I. G., Frankfort-am-Main, Germany.

Production salt having composition corresponding to the theoretical formula $Fe_2Cl_4SO_4$; reacting sulfate with an alkaline earth metal chloride in presence of water. No. 2,137,361. Edgar A. Slagle, No. Plainfield, N. J., to Research Corp., New York City.

Removal water from articles; providing a bath of a volatile organic water insoluble liquid containing an emulsifying agent effective for removing water from articles immersed in said bath. No. 2,137,404. Hanns Hollerer to Dr. Alex. Wacker Gesellschaft fur Elektrochemische Industrie, G. m. b. H., both of Munich, Germany.

Process hydrogenating an unsaturated oxygen-to-carbon linkage of an organic compound containing same. No. 2,137,407. Wilbur A. Lazier to du Pont, both of Wilmington, Del.

Process for concentration of isotopes. No. 2,137,430. Wells A. Webb, Berkeley, Calif.

Polymerizing treatment of unsaturated hydrocarbon vapors containing diolefines; subjecting vapors to action of a granular catalyst, then driving off liberated ammonia. No. 2,137,492. Julius Hyman to Velsicol Corp., both of Chicago, Ill.

Production sulfur-containing high molecular weight compounds, and products thereof. No. 2,137,584. Emil Ott, Elsmere, Del., to Hercules Powder Co., Wilmington, Del.

Process washing out a weak gaseous acid from class consisting of hydrogen sulfide and carbon dioxide from a gas containing same in admixture with hydrocyanic acid and cyanogen. No. 2,137,602. Hans Baehr and Wilhelm Wenzel, Leuna, and Helmut Mengdehl, Huels, Germany, to I. G., Frankfort-am-Main, Germany.

Production anhydrous and absolute alcohols; passing alcohol vapors containing water vapor through a bed of freshly reactivated alumina adsorbent moistened with alcohol vapors. No. 2,137,605. Ralph B. Derr, Oakmont, Pa., to Aluminum Co. of America, Pittsburgh, Pa.

Process and apparatus for mining sulfur. No. 2,137,619. Clarence O. Lee, Port Sulphur, La., to Freeport Sulphur Co., corp. of Del.

Preparation an aluminum hydroxide hydrogel; neutralizing an aqueous solution of an aluminum salt with an alkali carbonate, then completing neutralization with an alkali bicarbonate. No. 2,137,638. Clarence W. Sondern and Chas J. Wesley Wiegand to Geo. A. Breon & Co., all of Kansas City, Mo.

Production α, β-dihalogenethylketones. No. 2,137,664. Otto Bayer, Leverkusen, and Johannes Nelles, Leverkusen-Schlebusch, Germany, to I. G., Frankfort-am-Main, Germany.

Process for obtaining MgO and $CaCO_3$ from dolomitic materials. No. 2,137,675. Walter H. McIntire, Knoxville, Tenn., to American Zinc, Lead & Smelting Co., St. Louis, Mo.

Treatment hydrocarbons. No. 2,137,727. Edw. F. Quirke, Brooklyn, N. Y.

Organic-phosphorus-containing compounds; composition comprising a phosphinic acid of an aliphatic petroleum hydrocarbon containing more than 5 carbon atoms. No. 2,137,792. Willard H. Woodstock, Homewood, Ill., to Victor Chemical Works, Chicago, Ill.

Production mono tertiary butyl pyrogallol; reacting an excess of pyrogallol with tertiary butyl alcohol and fused zinc chloride as condensing agent. No. 2,137,815. Fritz E. Stockelbach, Montclair, N. J.

Purification of mercapto aryl thiazoles. No. 2,137,820. Ira Williams and Bernard M. Sturgis, Woodstown, N. J., to du Pont, Wilmington, Del.

Process for obtaining metal compounds of water-soluble keratin splitting products. No. 2,137,927. Ernst Sturm and Richard Fleischmann to Chemische Fabrik Johann A. Wulfing, all of Berlin, Germany.

Process for treating coal. No. 2,137,932. Oliver M. Urbain and Wm. R. Stemen, Columbus, O., to Chas. H. Lewis, Harpster, O.

Preparation of a sorptive etherated coal; reacting chlorinated coal with a hydroxy compound, recovering the etherated product, and washing with water. No. 2,137,933. Oliver M. Urbain and Wm. R. Stemen, Columbus, O., to Chas. H. Lewis, Harpster, O.

Composition to revivify wood, consisting of a dehydrated mixture of mucilage, glycerine, and glycol. No. 2,137,948. Chas. H. Ostrander, Bloomfield, N. J.

Production alkaline earth metal double salts of organic acids. No. 2,137,957. Herman Seydel, Jersey City, and Albert H. Reiners, Cranford, N. J., to Seydel Chemical Co., Jersey City, N. J.

Corn conversion process. No. 2,137,973. Raymond E. Daly and Jas. F. Walsh, Chicago, Ill. to American Maize Products Co., corp. of Me.

Preparation viscose syrup. No. 2,130,014. Geo. A. Richter to Brown Co., both of Berlin, N. H.

Production of a nitrate and chlorine from nitric acid and a metal chloride. No. 2,138,016. Herman A. Beekhuis, Jr., Petersburg, Va., to Solvay Process Co., New York City.

Decomposition of nitrosyl chloride, passing said chloride in contact with hot nitric acid solution at a temperature of 50°C. or higher. No. 2,138,017. Herman A. Beekhuis, Jr., Petersburg, Va., to Solvay Process Co., New York City.

Baking powder comprising bicarbonate of soda and acid calcium tetraphosphate in intimate admixture. No. 2,138,029. Augustus H. Fiske, Warren, R. I., to Rumford Chemical Works, Rumford, R. I.

Preparation polymeric beta-diethyl-aminoethyl acrylate. No. 2,138,031. Geo. D. Graves to du Pont, both of Wilmington, Del.

Production ammonia from nitrogen and hydrogen. No. 2,138,122. Ovid E. Roberts, Jr., Washington, D. C.

Method of and apparatus for absorbing oxides of nitrogen under pressure. No. 2,138,165. Ingenuin Hechenbleikner, Charlotte, N. C., to Chemical Construction Corp., New York City.

Production of precipitated sulfur. No. 2,138,214. Wm. H. Shiffler and Philip S. Danner, Berkeley, Calif., to Standard Oil Co. of Calif., San Francisco, Calif.

Preparation aqueous dispersion of poylmerized halogen-2-butadienes-1, 3. No. 2,138,226. Benton Dales, Chadds Ford, Pa., and Fred. Baxter Downing, Carneys Point, N. J., to du Pont, Wilmington, Del.

Method recovering heat and chemicals from waste liquors. No. 2,138,278. Alfred G Kernin, Mosinee, Wis., 60 per cent. to Babcock & Wilcox Co., New York City, and 40 per cent. to Canada Paper Co., Montreal, Que., Canada.

Treating cadmium bearing materials; introducing chlorine into said material in presence of water, in final step adding metallic zinc to solution to precipitate cadmium. No. 2,138,281. Warren H. Leverett, Bartlesville, Okla., to National Zinc Co., New York City.

Conditioning wood pulp for nitration. No. 2,138,283. Geo. A. Richter, Berlin, N. H., to Douglas H. McMurtrie, Gorham, N. H., to Brown Co., Berlin, N. H.

Special retort and apparatus for refining raw materials in solid, liquid, vapor, and gaseous form. No. 2,138,321. Constantin Paul Bratasianu, Craiova, Rumania.

Method purifying an aqueous concentrated sodium hydroxide solution. No. 2,138,347. Raymond M. Law and Harry C. Britton, Syracuse, N. Y., to Solvay Process Co., New York City.

Preparation aqueous potassium hydroxide solution, having a KOH concentration between 20 and 30 per cent., from aqueous potassium hydroxide solution of around 50 per cent. concentration. No. 2,138,357. Arthur W. Saddington and Arlie P. Julien, Syracuse, N. Y., to Solvay Process Co., New York City.

Preparation mixed crystals of titanium dioxide; heating latter with a reducing agent. No. 2,138,384. Georg Meder, Leverkusen-I. G. Werk, Germany, to I. G., Frankfort-am-Main, Germany.

An alkyl-phenylphenol compound substituted in the hydroxylated benzene ring with at least one branched-chain alkyl group containing at least 5 carbon atoms. No. 2,138,471. Edgar C. Britton, Gerald H. Coleman, and Ralph P. Perkins to Dow Chemical Co., all of Midland, Mich.

Process for converting finely divided solid alkali metal carbonate to the corresponding cyanide. No. 2,138,519. Walton Barr Tanner, Niagara Falls, N. Y., to du Pont, Wilmington, Del.

Manufacture butyl esters of alpha, alpha-dimethyl-alpha'-carboxydihydro-gamma-pyrone. No. 2,138,540. Jared H. Ford to Kilgore Development Corp., both of Washington, D. C.

Catalyst for production of olefine oxides by the oxidation of olefines with oxygen-containing gas. No. 2,138,583. Herbert Langwell, Windmill End, Epsom, Chas. Bernard Maddocks, Epsom, and John Francis Short, Cheam, England, to Carbide & Carbon Chemicals Corp., New York City.

Preparation polysulfones; reacting sulfur dioxide in presence of a catalyst. No. 2,138,584. Carl S. Marvel, Urbana, Ill., to du Pont, Wilmington, Del.

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Process for dyeing hardened casein, applying to material from a dyebath a dyestuff of the monoazo and anthraquinone dyestuffs. No. 2,138,-602. Frederick Hill and Jack Augustus Radley, Blackley, England, to Imperial Chemical Industries, corp. of Great Britain.
Process hydrolyzing monochlorbenzene in the vapor phase. No. 2,138,-609. Albert W. Meyer, Nutley, N. J., to A. O. Smith Corp., Milwaukee, Wis.
Electric cable sheath comprising lead stabilized with 0.001 per cent. sodium. No. 2,138,614. Bernard B. Reinitz to Okonite-Callender Cable Co., both of Paterson, N. J.
Method for pulverizing a hard cemented carbide composition. No. 2,138,672. Frank F. White, Scotia, N. Y., to General Electric Co., corp. of New York.
Process for making impervious or fixing pervious or loose subsoil layers, and other porous masses, by causing an aqueous dispersion of a bituminous substance to penetrate into the soil or mass to be treated. No. 2,138,713. Francis D. Sullivan, Memphis, Tenn.
Anticryptogamic composition for plants which consists of a homogeneous mixture of calcium oxide and completely dehydrated copper sulfate, both in finely powdered condition. No. 2,138,733. Albert D'Amico, Rome, Italy.
Manufacture thiazole compounds. No. 2,133,969. Edwin R. Buchman to Research Corp., both of New York City.
Preparation thiazole compounds. No. 2,134,015. Robt. R. Williams, Roselle, N. J., to Research Corp., New York City.
Preparation 1, 1-dichlorpropene-1; by reacting 1, 1, 2 trichlorpropane with a basic compound of a metal. No. 2,134,102. Oliver W. Cass, Niagara Falls, N. Y., to du Pont, Wilmington, Del.
Process nitrogen fixation; subjecting mixture of nitrogen and oxygen, wherein the oxygen content of the mixture is less than 7½ per cent. to a high frequency brush discharge. No. 2,134,206. Ovid E. Roberts, Jr., Washington, D. C.
Solution of the ascorbic acid salts of histidine in oxygen free water in a container excluding oxygen. No. 2,134,246. Franz Elger, Basel, Switzerland, to Hoffman-LaRoche, Inc., Nutley, N. J.
Production etherified derivatives of pentahydroxy-fuchsone. No. 2,134,-247. Zoltan Foldi, Budapest, Hungary.
Production water enriched with heavy water. No. 2,134,249. Fritz Hansgirg, Konan, Korea.
Rubber-like product obtained by reacting a polymer of vegetable oil, completely heat-polymerized to a gelatinous stage, glycerol, and phthalic anhydride. No. 2,134,335. Harvey G. Kittredge to Kay & Ess Chemical Corp., both of Dayton, O.
Process esterifying a phenolic body containing free hydroxyl groups; heating same with a mixed anhydride of a carboxylic acid boiling below 190°C., and a carboxylic acid boiling above 200°C. No. 2,134,388. Oscar A. Cherry, Chicago, Ill., to Glidden Co., Cleveland, O.
Manufacture resinous esterification products of inner ethers. No. 2,134,429. Kenneth M. Brown, Tamaqua, Pa., to Atlas Powder Co., Wilmington, Del.
Production resinous reaction products of inner ethers and natural resin acids. No. 2,134,430. Rudolph Max Goepp, Jr., Tamaqua, Pa., to Atlas Powder Co., Wilmington, Del.
Manufacture alkyl-phenyloxy-ethers of 2:4 dinitrobenzene. No. 2,134,-434. Troy Lee Cantrell and James Otho Turner, Lansdowne, Pa., to Gulf Oil Corp., Pittsburgh, Pa.
Production hydroxy-sulfonic acids. No. 2,134,446. Walter Kern, Sissach, Switzerland, to Society of Chemical Industry in Basle, Basel, Switzerland.
Manufacture water-soluble calcium compounds; characterized by the fact that dry calcium salts of polyhydroxymonocarboxylic acids, derived from polyaldoses, are pulverized together with crystallized calcium bromide. No. 2,134,456. Arthur Stoll and Ernst Burckhardt to Chemical Works formerly Sandoz, all of Basel, Switzerland.
Removal sulfur dioxide from waste gases. Nos. 2,134,481-2. Henry F. Johnstone, Urbana, Ill., to Commonwealth Edison Co., Chicago, Ill.
Method desulfurizing gases obtained from oil refinery operations. No. 2,134,507. Horace B. Cooke, Greenwich, Conn., to Process Management Co., New York City.
Treatment hydrocarbons to remove sulfur compounds. No. 2,134,518. Percival C. Keith, Jr., Peapack, N. J., to Process Management Co., New York City.
Esterification process; manufacture of butyl acetate by mixing butyl alcohol and acetic acid of high concentration in presence of a catalyst. No. 2,134,537. Jacob Stein to Publicker, Inc., both of Phila., Pa.
Vanadium oxide catalyst. No. 2,134,543. Chester E. Andrews, Overbrook, Pa., to Rohm & Haas Co., Phila., Pa.
Production of a non-poisonous gas of high calorific power. No. 2,134,548. Friedrich Danulat, Frankfort-am-Main, Germany, to American Lurgi Corp., New York City.
Lubricating composition of high film strength, comprising hydrocarbon oil and an organic compound. No. 2,134,554. Lloyd P. Grobel, Schenectady, N. Y., to General Electric Co., corp. of New York.
Manufacture synthetic fibrous product. No. 2,134,659. Geo. H. Ellis, St. Paul, Minn., to Insulite Co., Minneapolis, Minn.
Molecular compounds of substitution products of pyridine, prepared by reaction between a C, C-disubstituted barbituric acid and a pyridine. No. 2,134,672. Curt Raeth, Radebeul, near Dresden, and Rudolf Gebauer, Dresden, Germany, to Chemische Fabrik von Heyden, A. G., Radebeul, Germany.
Production elastic objects from polyvinyl alcohol. No. 2,138,751. Herbert Vohrer, Berlin, Germany, to Techno Chemie Kommanditsgesellschaft Kessler & Co., Berlin, Germany, and Dr. Schnabel & Co., Komm.-Ges., Berlin-Neukolin, Germany.
Production 4-methyl uracil and homologues thereof. No. 2,138,756. Albert B. Boese, Jr., Pittsburgh, Pa., to Carbide & Carbon Chemicals Corp., New York City.
Manufacture carbon dioxide ice. No. 2,138,758. Du Bois Eastman, Port Arthur, Tex., to Texas Co., New York City.
Method converting to a water-soluble acid addition salt a monomeric ester of an alpha-alkyl-alpha-methylene monocarboxylic acid and an amino alcohol in which the amino group is tertiary, subsequently polymerizing said salt. No. 2,138,762. Jesse Harmon to du Pont, both of Wilmington, Del.
Preparation an amino alcohol ester of an a-alkacrylic acid; reacting a lower aliphatic alcohol ester of an a-alkacrylic acid with an amino alcohol in which the amino nitrogen is tertiary. No. 2,138,763. Geo. D. Graves to du Pont, both of Wilmington, Del.
Preparation diamides of unsaturated carboxylic acids. No. 2,139,679. Vernal R. Hardy to du Pont, both of Wilmington, Del.
Production thiourea derivatives; a thiourea wherein one of the amino hydrogen atoms on one nitrogen atom is replaced by an acyclic radical which contains at least 8 carbon atoms, and another of the amido hydrogen atoms on the other nitrogen atom is replaced by a radical which contains a water-solubilizing polar group. No. 2,139,697. Paul Lawrence Salzburg to du Pont, both of Wilmington, Del.
Production aromatic mercury malates. No. 2,139,711. Carl N. Andersen, Wellesley Hills, Mass., to Lever Bros. Co., corp. of Maine.
Production aromatic mercury gluconates. No. 2,139,712. Carl N. Andersen, Wellesley Hills, Mass., to Lever Bros. Co., corp. of Maine.
Concentration nitric acid. No. 2,139,721. Fred Carl to du Pont, both of Wilmington, Del.
Filler material for welding and brazing; comprising silicon, phosphorus, manganese, and copper. No. 2,139,730. Jos. Ralph Dawson, Niagara Falls, N. Y., to Oxweld Acetylene Co., corp. of W. Va.
Manufacture dry rectifiers, in particular rectifying elements consisting of a copper part covered with a layer of copper oxide. No. 2,139,791. Etienne Barrey, Nanterre, France.
Compound consisting of the water insoluble product of the reaction between fatty acids derived from drying oils and an alkaloid. No. 2,139,839. Robt. S. McKinney, Chevy Chase, Md., to free use of the People of the U. S.
Art of treating oiticica oil, using hydrochloric acid in process. No. 2,139,864. John P. Stancil, Pine Lawn, Mo.
Manufacture magnesium basic carbonate. No. 2,139,934. Heinz H. Chesny, San Mateo, Calif., to Marine Chemicals Co., Ltd., So. San Francisco, Calif.
Heat transfer fluid; fireproof liquid comprising solid halogenated naphthalene compound in admixture with a liquid halogenated cyclic compound. No. 2,139,945. James G. Ford, Forest Hills, Pa., to Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.
Hydration of olefines. No. 2,139,953. Henri Martin Guinot, Niort, Deux-Sevres, France, to Usines de Melle, Melle, France.
Colored glass coated refractory granules, colored coating consisting of the fusion product of aqueous sodium silicate solution, a dry insoluble form of lead, dry finely ground barium carbonate, dry powdered borax and coloring agent. No. 2,139,955. Carl E. Hillers, Charlottesville, and Horatio L. Small, Esmont, Va., to Blue Ridge Slate Corp., Charlottesville, Va.
Conversion gaseous hydrocarbons into liquid hydrocarbons. No. 2,139,969. Eugene C. Mills, Berkeley, Calif.
Process for avoiding swelling up of solid boron compounds when heated; heating mixture of the boron compound with a degassed carbon. No. 2,140,029. Erich Noack, Odenthal, and Friedrich Schubert, Leverkusen-Wiesdorf, Germany, to I. G., Frankfort-am-Main, Germany.
Production polymerization products by polymerization of a nitrile. No. 2,140,048. Hans Fikentscher and Claus Heuck, Ludwigshafen-am-Rhine, Germany, to I. G., Frankfort-am-Main, Germany.

Leather

Method treating skins to impart thereto a chamois leather character and render them resistant to boiling water; incorporating in skins and in presence of each other an acidified dichromate solution and a tanning oil. No. 2,136,433. Georges Robt. Gasnier, La Suze, France, to Jacques Wolf & Co., Passaic, N. J.
Tanning agent; the sulfonating product from a mixture of a phenolic body and a natural resin, having an electrolyte content not higher than 10 per cent., mixed with synthetic tanning agents. No. 2,136,997. Werner Asch, Walter Pense, and Arthur Voss, Frankfort-am-Main-Hochst, and Heinrich Janz, Bad-Soden-on-Taunus, Germany, to I. G. Frankfort-am-Main, Germany.
Tanning process; subjecting materials to tanning liquor containing an alkali-metal hexametaphosphate. No. 2,140,008. Ralph E. Hall, Mt. Lebanon, Pa., to Hall Labs., Inc., Pittsburgh, Pa.
Method tanning animal skin; pretanning same with solution of the formula $M_2O.P_2O_5$, in which M is hydrogen, ammonium and/or an alkali-metal, and in which the molar ratio of M_2O to P_2O_5 is less than 2:1. John Arthur Wilson, Milwaukee, Wis., to Hall Labs., Pittsburgh, Pa.
Method tanning animal skin by treatment with a solution containing a compound of the formula $(M_2O)x.(P_2O_5)y$, in which M is hydrogen, ammonium and/or an alkali-metal, and in which the molar ratio of M_2O to P_2O_5 is less than 2:1. John Arthur Wilson, Milwaukee, Wis., to Hall Labs., Pittsburgh, Pa.

Metals, Alloys, Ores

Alloy containing tungsten, boron, chromium, vanadium, manganese, silicon, and iron. No. 2,135,494. Anthony de Golyer, New York City.
Alloy containing molybdenum, boron, chromium, vanadium, manganese, silicon, and iron. No. 2,135,495. Anthony G. de Golyer, New York City.
Manufacture ferro-molybdenum from copper-bearing molybdenum-containing material. No. 2,135,630. John D. Sullivan and Dimitry Niconoff, Columbus, O., to Kennecott Copper Corp., New York City.
Production beryllium alloys. No. 2,135,983. Menahem Merlub-Sobel, Cleveland, O., to Beryllium Corp., New York City.
Production aluminum base alloy, containing copper, zinc, tin, and aluminum. No. 2,136,053. Noak Victor Hybinette, Jackson, Mich.
Method electrodepositing chromium from solution of chromic acid; reducing chromic acid at the cathode in presence of manganese dioxide, potassium permanganate, manganese chloride, and Rochelle salts, by passing an electrical current through solution. No. 2,136,197. Robt. W. Shaffer to Snap-on-Tools, Inc., both of Kenosha, Wis.
Production copper alloys. Nos. 2,136,211-2. Franz R. Hensel and Earl I. Larsen to P. R. Mallory & Co., all of Indianapolis, Ind.
Method recovering ozocerite from its ore. No. 2,136,380. Henry Randel Dickinson, Grand Rapids, Mich.
Leaching and precipitating process and apparatus. No. 2,136,372. John L. Burnett, St. Louis, Mo.
Process extracting precious metals from ores by cyanidation. No. 2,136,409. Lorin Bice, Laurel, and Fred Soular, Billings, Mont., to A. O. Smith Corp., Milwaukee, Wis.
Treatment lead ores by the roasting reaction process. No. 2,135,434. Kurt Rudolf Gohre, Frankfort-am-Main, Germany, to American Lurgi Corp., New York City.
Copper-thorium alloys. No. 2,136,548. Franz R. Hensel and Earl Larsen to P. R. Mallory & Co., all of Indianapolis, Ind.
Copper-uranium alloy to which an element has been added, taken from the second group of the periodic system. No. 2,136,549. Franz R. Hensel and Earl I. Larsen to P. R. Mallory & Co., all of Indianapolis, Ind.
Bearing alloy consisting of silver, copper, antimony, and cadmium. No. 2,136,655. Julian G. Ryan, Wood River, Ill., to Shell Development Co., San Francisco, Calif.

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Treatment metal stock and/or rolls during cold rolling, using solution containing an alkali and an acid. No. 2,136,725. Gilbert H. Orozco, East Cleveland, O.

Corrosion-resisting steel possessing good physical properties of ductility, malleability, and toughness, containing copper, nickel, phosphorus, carbon, manganese, sulfur, silicon, and iron. No. 2,136,736. Flint C. Elder, Cleveland Heights, Ohio.

Production silver alloys, characterized by less tendency to oxidize or sulfide than a straight silver-copper alloy of similar proportions wherein iron or cobalt is used instead of nickel. No. 2,136,915. Kenneth L. Emmert to P. R. Mallory & Co., both of Indianapolis, Ind.

Age-hardened alloy containing tin, zirconium, and copper, characterized by a combination of high hardness and high electrical and head conductivity. No. 2,136,918. Franz R. Hensel and Earl I. Larsen to P. R. Mallory & Co., all of Indianapolis, Ind.

Age-hardened alloy made from beryllium, silver, tin, and copper, characterized by high hardness and electrical conductivity. No. 2,136,919. Franz R. Hansel and Earl I. Larsen to P. R. Mallory & Co., all of Indianapolis, Ind.

Process for sintering of concentrates, ores, or the like. No. 2,137,049. Anders Holmberg, Stockholm, Sweden.

Alloy consisting of molybdenum, boron, zirconium, chromium, vanadium, carbon, and iron. No. 2,137,109. Anthony de Golyer, New York City.

Alloy consisting of molybdenum, boron, zirconium, cobalt, chromium, vanadium, carbon, and iron. No. 2,137,110. Anthony de Golyer, New York City.

Production copper alloys. Nos. 2,137,281-2-3-4-5. Franz R. Hensel and Earl I. Larsen to P. R. Mallory & Co., all of Indianapolis, Ind.

Removal fluorspar from zinc concentrates. No. 2,137,600. Frederick C. Abbott, Tulsa, Okla., Strathmore R. B. Cooke, Rolla, Mo., and Carl O. Anderson, Baxter Springs, Kans., to Mahoning Mining Co., Youngstown, O.

Method stabilizing properties of age-softening cold worked aluminum base alloys containing magnesium. No. 2,137,624. Jos. A. Nock, Jr., Tarentum, and Fred Keller, New Kensington, Pa., to Aluminum Co. of America, Pittsburgh, Pa.

Production machine part subject to sliding friction constructed of an alloy composed of magnesium, iron, and aluminum. No. 2,137,639. Hans Steudel and Heinz Wiechell to Junkers Flugzeug-und-Motorenwerke, Aktiengesellschaft, both of Dessau, Germany.

Process deoxidizing steels and irons; adding to molten metal an alloy containing titanium, aluminum, silicon, carbon, and manganese. No. 2,137,863. Jerome Strauss, Pittsburgh, Pa., and Geo. L. Norris, Scarsdale, N. Y., to Vanadium Corp. of America, Bridgeville, Pa.

Production titanium steel. No. 2,137,945. Walther Mathesius, Berlin-Nikolassee, Germany.

Coated iron article. No. 2,137,968. Robt. R. Tanner, Detroit, Mich., to Parker Rust-Proof Co.

Method treating an anodically formed film on magnesium and its alloys; heating the coated metal at a temperature above 100°C. and lower than the fusion point of the metal in a hydrocarbon. No. 2,138,023. Robert W. Buzzard, Kensington, Md., and James H. Wilson, Washington, D. C.

Solder filled wire for use in manufacture of jewelry, etc., comprising a hollow, tubular body made from a silver cadmium alloy and a silver solder core. No. 2,138,088. Edw. A. Capillon to D. E. Makepeace Co., both of Attleboro, Mass.

Process for attacking a titaniferous ore with acid, using sulfuric acid in process. No. 2,138,090. Oscar T. Coffelt, Jackson, Mich., to du Pont, Wilmington, Del.

Production chromium-manganese-nickel steel. No. 2,138,289. Frederick M. Becket, New York City, and Russell Franks, Niagara Falls, N. Y., to Metallurgical Co., corp. of W. Va.

Process for coloring surfaces of ferrous metal articles; steeping articles in bath comprising an aqueous solution of caustic soda, sodium cyanide, lead oxide, and lead acetate. No. 2,138,295. Leslie Collingwood, Fenwicke, London, England.

Consistent production of nickel and nickel alloys containing calcium. No. 2,138,459. Leonard Bessemer Pfeil, Birmingham, England, to International Nickel Co., New York City.

Method effecting electro-deposition of rhenium, passing current through a sulfate solution containing a soluble rhenium compound. No. 2,138,573. Colin G. Fink and Pincus Deren, New York City, to Vereinigte Chemische Fabriken Zu Leopoldshall, Aschersleben, Germany.

Electric contact element formed of an alloy made from copper, nickel, an element from the group of palladium and platinum, and silver. No. 2,138,599. Childress B. Gwyn, Jr., Bannockburn, Ill., to P. R. Mallory & Co., Indianapolis, Ind.

Production alloy from silver, copper, manganese, zinc, nickel, and silicon. No. 2,138,637. Robert H. Leach, Fairfield, Conn., to Handy & Harman, New York City.

Alloy containing silver, copper, manganese, nickel, and silicon. No. 2,138,638. Robt. S. Leach, Fairfield, Conn., to Handy & Harman, New York City.

Process alloying metals with lead. No. 2,138,729. Wm. Thos. Butcher, Ilford, England, to Goodlass Wall and Lead Industries, London, England.

Process for gold plating chromium alloy steels. No. 2,133,995. Hiram Stanhope Lukens, Phila., Pa., to C. Howard Hunt Pen Co., Camden, N. J.

Method gold plating a chromium alloy steel article. No. 2,133,996. Jos. E. Underwood to C. Howard Hunt Pen Co., both of Camden, N. J.

Method contacting fine ores with gases; recovering chromium value in a chromite ore. No. 2,133,997. Chas. G. Maier, Oakland, Calif., to Great Western Electro-Chemical Co., corp. of Calif.

Method continuously chlorinating chromite ores. No. 2,133,998. Chas. G. Maier, Oakland, Calif., to Great Western Electro-Chemical Co., corp. of Calif.

Method concentrating ores; using Portland cement in process. No. 2,134,103. Geo. L. Collord, Pittsburgh, Pa.

Manufacture hard metal alloys. No. 2,134,305. Richard Kieffer, Reutte, Austria, to American Cutting Alloys, Inc., New York City.

Method treating metal; pickling same and oiling while it is wet. No. 2,134,319. Morris D. Stone, Pittsburgh, Pa., to United Engineering & Foundry Co., both of Pittsburgh, Pa.

Method dewaxing mineral oil. Nos. 2,134,336-7. Edwin C. Knowles, Beacon, N. Y., to Texas Co., New York City.

Manufacture oxide coated cathodes. No. 2,134,415. Imre Patai, Budapest, Hungary, to N. V. Philips Gloeilampenfabrieken, Eindhoven, Netherlands.

Alloy consisting of nickel, chromium, and cobalt. No. 2,134,423. Enrique Touceda to Consolidated Car-Heating Co., both of Albany, N. Y.

Treatment lead bearing ores and preparation compounds therefrom. No. 2,134,528. Thos. A. Mitchell, Inglewood, Calif., to Hughes-Mitchell Processes, Inc., Denver, Colo.

Alloying briquette comprising a solid mass of roasted molybdenite concentrates and pitch binder. No. 2,134,616. Arthur Linz to Climax Molybdenum Co., both of New York City.

Alloying agent for producing molybdenum; a briquette formed of a mixture of molybdenum dioxide and a reducing binder. No. 2,134,617. Arthur Linz to Climax Molybdenum Co., both of New York City.

Corrosion-resisting ferrous alloy produced from nickel, chromium, silicon, copper, molybdenum, carbon, and iron. No. 2,134,670. James A. Parsons, Jr., to Duriron Co., both of Dayton, O.

Production coating on articles of magnesium and its alloys; subjecting article to action of an aqueous solution containing chromic sulfate and an alkali metal chromate. No. 2,138,794. Chas. E. Nelson and Herbert De Long to Dow Chemical Co., all of Midland, Mich.

Ingot iron containing also phosphorus, silicon, and carbon. No. 2,138,797. Marvin J. Udy, Niagara Falls, N. Y., to Monsanto Chemical Co., St. Louis, Mo.

Method and apparatus for separating fragmentary minerals of different specific gravities in crushed ores. No. 2,139,789. Chas. Erb Wuensch, Berkeley, Calif., to Wuensch Hetero Concentration Process Co., Wilmington, Del.

Method of making steel; first forming molten iron bath and adding metal oxides, carbon and fluxing materials. No. 2,139,853. Wilhelm Rohn to Heraeus-Vacuumschmelze A. G., both of Hanau-am-Main, Germany.

Production iron alloy that will not suffer undue permanent growth or cracking from high heating. No. 2,139,939. Wm. J. Doyle and Justus J. Wollenhaupt to Williamson Heater Co., all of Cincinnati, Ohio.

Naval Stores

Polymerization of rosin; bringing solution of rosin, in a volatile liquid organic compound, into intimate contact with strong sulfuric acid under conditions of reaction, to effect polymerization. No. 2,136,525. Alfred L. Rummelsburg to Hercules Powder Co., both of Wilmington, Del.

Treatment abietyl compounds and products obtained thereby. No. 2,137,576. Edwin R. Littmann to Hercules Powder Co., both of Wilmington, Del.

Treatment of rosins and metal salts produced thereby. No. 2,138,183. Edwin R. Littmann to Hercules Powder Co., both of Wilmington, Del.

Product of the reaction of an acidic pine wood pitch obtained by extraction of pine wood, comprising oxidized resinous matter, oxidized terpenes, polyphenols and polymerized terpenes with an alcohol. No. 2,138,193. Ernest G. Peterson to Hercules Powder Co., both of Wilmington, Del.

Paper and Pulp

Method increasing pliancy and softness of paper, paper-cloths and paper tissues; adding to paper pulp water soluble salts of condensation products of lysalbinic acid with soap-forming acid. No. 2,137,310. Fritz Sommer, Berlin-Charlottenburg, Germany, to Chemische Fabrik Grunau, Landshoff & Meyer, Akt. Ges., Berlin-Grunau, Germany.

Process manufacturing cigarette paper; treating same with a composition containing a vinyl resin. No. 2,137,706. Richard T. Ubben to du Pont, both of Wilmington, Del.

Manufacture neutral sized paper; using aqueous bath containing a colloidal dispersion of aluminum resinate, a protective colloid, and ammonium hydroxide. No. 2,138,325. Walter A. Nivling, Newton Center, Mass.

Petroleum

Process polymerizing olefines and catalyst therefor. No. 2,135,793. Lloyd F. Brooke, Berkeley, Calif., to Standard Oil Co. of Calif., San Francisco, Calif.

Production iso-octanes from a normally gaseous hydrocarbon mixture containing isobutene and normal butenes. No. 2,135,823. Arthur L. Lyman and Melvin M. Holm, Berkeley, Calif., to Standard Oil Co. of Calif., San Francisco, Calif.

Oil cracking process. No. 2,135,876. Geo. C. Peckham, Los Angeles, Calif.

Method refining mineral oils by means of inorganic fluorine compounds. No. 2,135,922. Ernst Torres, Berlin, Germany, Josef Moos, New York City, and Hans Ramser, Long Island City, N. Y., to Edelneau Gesellschaft m. b. H., corp. of Germany.

Method and apparatus for producing a high flash safety fuel. No. 2,135,923. John W. Throckmorton, New York City, to Pure Oil Co., Chicago, Ill.

Production polymeric products of high molecular weight; reacting sulfur dioxide with mono-olefins at temperatures below +15°C. No. 2,136,028. Robert Dewey Snow to Phillips Petroleum Co., both of Bartlesville, Okla.

Method separating lubricating oils from topped crude oil. No. 2,136,172. Ross C. Powell, Forest Hills, N. Y., to Texas Co., New York City.

Improved Diesel fuel comprising a mineral hydrocarbon fuel and in admixture therewith a minor proportion of diazo-amino-benzene, sufficient to decrease the ignition delay period of the fuel. No. 2,136,455. Robt. C. Moran, Wenonah, and Everett W. Fuller and Geo. S. Crandall, Woodbury, N. J., to Socony-Vacuum Oil Co., New York City.

Improved Diesel fuel composition comprising a hydrocarbon fuel oil and in admixture therewith a triazene. No. 2,136,456. Robt. C. Moran, Wenonah, and Everett W. Fuller and Geo. S. Crandall, Woodbury, N. J., to Socony-Vacuum Oil Co., New York City.

Separation and purification of aromatic and non-aromatic nitrogen bases. No. 2,136,604. James R. Bailey, Austin, Tex., to Union Oil Co. of Calif., Los Angeles, Calif.

Recovery organic acids contained in petroleum oils and its fractions; contacting oils with an aqueous alkali solution containing soaps of organic acids. No. 2,136,608. Arthur L. Blount, Palos Verdes Estates, Calif., to Union Oil Co., of Calif., Los Angeles, Calif.

Conversion hydrocarbon oils. No. 2,136,715. Kenneth Swartwood to Universal Oil Products Co., both of Chicago, Ill.

Method refining mineral oils by means of aromatic fluorine compounds. No. 2,136,767. Ernest Terres, Berlin, Germany, and Josef Maas, New York City, and Hans Ramser, Long Island City, N. Y., to Edelneau Gesellschaft m. b. H., corp. of Germany.

Catalytic polymerization of normally gaseous hydrocarbons by means of a phosphoric acid-film catalyst. No. 2,136,785. Wm. N. Davis, Berkeley, Calif., to Standard Oil Co. of Calif., San Francisco, Calif.

Petroleum lubricating oil having Saybolt Universal viscosity upwards of 50 seconds at 110°F., containing quinaldine to inhibit oxidation of

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the oil up to temperatures to which the oil will be raised during lubrication of an internal combustion engine. No. 2,136,788. Matthew Fairlie, Hammond, Ind., to Sinclair Refining Co., New York City.

Motor fuel consisting of gasoline containing constituents normally tending to deteriorate and form gum during storage to which has been added a gum inhibitor. No. 2,137,080. Herbert G. M. Fischer, Westfield, and Clifford E. Gustafson, Elizabeth, N. J., to Standard Oil Development Co., corp. of Del.

Method separating hydrocarbon oil containing paraffinoid and non-paraffinoid constituents into fractions rich in said constituents. No. 2,137,206. Francis X. Govers, Vincennes, Ind., to Indian Refining Co., Lawrenceville, Ill.

Removing wax and asphaltic constituents from oil. No. 2,137,207. James H. Grahame, Mt. Vernon, and Wm. L. Douthett, Jackson Heights, N. Y., to Texas Co., New York City.

Process dewaxing wax-bearing oil. No. 2,137,208. Howard H. Gross, Beacon, and Wynkoop Kiersted, Jr., Scarsdale, N. Y., to Texas Co., New York City.

Method separating wax from mineral oil. No. 2,137,209. Edwin C. Knowles, Beacon, N. Y., to Texas Co., New York City.

Manufacture low pour test, high viscosity index lubricating oil from wax-bearing mineral lubricating oil stock. No. 2,137,218. Francis X. Govers, Vincennes, Ind., to Indian Refining Co., Lawrenceville, Ill.

Production aqueous bituminous emulsions of the slow breaking type, first emulsifying melted asphalt with an aqueous solution of alkali, in final process commingling dispersion with clay. No. 2,137,226. Ulric B. Bray and Lawton B. Beckwith, Palos Verdes Estates, Calif., to Union Oil Co., of Calif., Los Angeles, Calif.

Process reconstituting and dehydrogenating heavier hydrocarbons and making an anti-knock gasoline. No. 2,137,275. Carleton Ellis, Montclair, N. J., to Standard Oil Development Co., corp. of Del.

Production improved Diesel fuel, composed of a hydrocarbon fuel oil and in admixture therewith a sulfurized terpene in an amount sufficient to decrease the ignition delay period of the fuel. No. 2,137,410. Robt. C. Moran, Wenonah, and Geo. S. Crandall, Woodbury, N. J., to Socony-Vacuum Oil Co., Inc., New York City.

Separation hydrocarbon oils into different fractions. No. 2,137,499. Richard Z. Moravec, Berkeley, Calif., to Shell Development Co., San Francisco, Calif.

Method dewaxing oils. No. 2,137,549. Philip Subkow to Union Oil Co. of Calif., both of Los Angeles, Calif.

Process obtaining valuable liquid hydrocarbons from a hydrocarbon mixture containing gaseous paraffins. No. 2,137,825. Pike H. Sullivan, New Rochelle, N. Y., to Gasoline Products Co., Newark, N. J.

Production asphalt emulsion of the water-in-oil type by use of an aqueous solution containing caustic alkali only as the emulsifying agent. No. 2,137,975. Ross J. Garofalo to Union Oil Co. of Calif., both of Los Angeles, Calif.

Adherent aluminum compound. No. 2,137,988. Chas. H. Hempel, Manitowoc, Wis., to Heresite & Chemical Co.

Polymerization of olefinic gases at temperatures of 850 to 1000°F. No. 20,931. Reissue. Robt. F. Ruthruff, Nutley, N. J., to Standard Oil Co., Chicago, Ill.

Solvent refining of petroleum oils containing paraffinic and non-paraffinic constituents, separating by extraction with a nitrochloroparaffin. No. 2,138,166. Arthur W. Hixson, Leonia, N. J., and Ralph Miller, New York City, to Chemical Foundation, Inc., corp. of Del.

Method oxidizing hydrosulfide solutions by means of an oxygen containing gas, in presence of an insoluble metal sulfide catalyst. No. 2,138,215. Wm. H. Shiffler and Melvin M. Holm, Berkeley, Calif., to Standard Oil Co. of Calif., San Francisco, Calif.

Conversion hydrocarbons. No. 2,138,541. Frederick E. Frey, Bartlesville, Okla., to Phillips Petroleum Corp., Washington, D. C.

Removal copper compounds from copper-sweetened hydrocarbon oils by treatment with a double sulfide of zinc and sodium in solid form. No. 2,138,566. Wayne L. Benedict to Universal Oil Products Co., both of Chicago, Ill.

Production low-boiling liquid hydrocarbon oil from gases containing olefins. No. 2,134,322. Harold V. Atwell, White Plains, N. Y., to Process Management Co., New York City.

Manufacture gasoline-like hydrocarbons. No. 2,134,325. Horace B. Cooke, Greenwich, Conn., to Process Management Co., New York City.

Separation wax from mineral oil by filtration. No. 2,134,331. Wm. P. Gee, Plainfield, N. J., to Texas Co., New York City.

Process extracting acid oil from a mineral oil distillate with an aqueous alkali metal hydroxide, whereby acid oils are caused to react with the hydroxide to produce a soap solution. No. 2,134,390. Bernard Sutro Greensfelder, Martinez, Monroe Edw. Spaght, Long Beach, and Clyde Harold Britten, Wilmington, Calif., to Shell Development Co., San Francisco, Calif.

Composition comprising mixed oil soluble phenolic compounds, of petroleum origin, unextractable from their source material with aqueous caustic. No. 2,134,547. Hyym E. Buc, Roselle, N. J., to Standard Oil Development Co., corp. of Del.

Gasoline type motor fuel containing a small amount of lead amid. No. 2,134,625. Sol Shappirio, Washington, D. C.

Manufacture gasoline of high anti-detonating characteristics and low gum-forming content from naphtha of low anti-detonating characteristics. No. 2,138,770. Rudolph C. Osterstrom, Kenilworth, Ill., to Pure Oil Co., Chicago, Ill.

Solvent refining of hydrocarbon oils. No. 2,138,772. Erich Saegebarth, Long Island City, N. Y., to Edelneau Gesellschaft, m. b. H., corp. of Germany.

Processes for refining hydrocarbon oils by means of benzol derivatives. No. 2,138,773. Ernst Terres, Berlin, Germany, Josef Moos, New York City, and Erich Saegebarth, Jackson Heights, N. Y., to Edelneau Gesellschaft, m. b. H., corp. of Germany.

Manufacture acylated condensation products. No. 2,138,809. Orland M. Reiff and Darwin E. Badertscher, Woodbury, N. J., to Socony-Vacuum Oil Co., New York City.

Process for polymerizing hydrocarbon gases. No. 20,950. Reissue. Wm. B. Plummer to Standard Oil Co., both of Chicago, Ill.

Sulfation of chlorhydrins; a reaction product of at least 6 carbon atoms, comprising a neutralized chlorhydrin ester. No. 2,139,669. Hyym E. Buc, Roselle, N. J., to Standard Oil Co., corp. of Del.

Separating and recovering constituents of petroleum products; intimately contacting a petroleum product in liquid form with dimethyl phthalate, under circumstances permitting development of a two-phase liquid, and separating two phases by gravity. No. 2,139,773. Raphael Rosen, Cranford, and Chas. A. Cohen, Elizabeth, N. J., to Standard Oil Development Co., corp. of Del.

Process and apparatus for treating mineral oils. No. 2,139,943. Merrell R. Fenske and Wilbert B. McCluer, State College, Pa., to Pennsylvania Petroleum Research Corp., corp. of Pa.

Pigments

Process hydrolytically precipitating titanium oxide from a hydrolyzable titanium salt solution. No. 2,133,941. Benjamin Wilson Allan to American Zirconium Corp., both of Balto., Md.

Manufacture cadmium red; calcining in a neutral atmosphere cadmium thio-selenide in admixture with molecules of cadmium oxide. No. 2,134,055. Walter F. Meister, Elizabeth, N. J., to Interchemical Corp., New York City.

A treated lithopone with improved gloss and flow-imparting qualities; using ordinary lithopone and a protein, of the class of glue, gelatine, and casein, distributed over the lithopone. No. 2,134,198. Kenneth S. Mowlds, Balto., Md., to Glidden Co., Cleveland, O.

Production carbon black from hydrocarbon gases. No. 2,134,228. Cecil G. Keeton, Independence, Mo., to Danciger Oil and Refineries, Inc., Tulsa, Okla.

Production white pigment comprising crystalline zinc-magnesium titanate. No. 2,139,686. Ekbert Lederle, Ludwigshafen, Max Gunther, Mannheim, and Rudolf Brill, Heidelberg, Germany.

Production lead chromate pigment; adding to a suspension of precipitated lead chromate for reaction therewith a reducing agent to restrain the crystal growth of the lead chromate. No. 2,139,753. Samuel C. Horning, Newark, N. J., to du Pont, Wilmington, Del.

Manufacture rubber stocks and pigment complexes for compounding therewith. No. 2,139,995. Frank G. Breyer, Wilton, Conn., and John P. Hubbell, Garden City, N. Y.

Plastics

Production moldable compositions by interacting urea and hexamethylenetetramine in aqueous solution in absence of formaldehyde, in presence of a catalyst. No. 2,134,235. Fritz Pollak, Vienna, Austria.

Manufacture zinc sulfide pigment by wet chemical precipitation. No. 2,136,376. Zoltan de Horvath, Western Springs, and Wm. B. Paris, Argo, Ill., to Eagle-Picher Lead Co., Cincinnati, O.

Luminescent zinc compounds. No. 2,136,871. Alfred Wakenhut, Seelze, near Hanover, Germany, to J. D. Riedel-E de Haen A. G., Berlin-Britz, Germany.

Composition having characteristics of a light-fast pigment stain, comprising pigment ground in oil, naphtha, water, a sulfonated oil, paraffin oil, soap, and water stain powder. No. 2,137,794. Michael Baffa to Lilly Varnish Co., both of Indianapolis, Ind.

Process converting wet pigment press cakes and pastes into dry, free running, dehydrated powders without sacrifice of pigmentary value. No. 2,138,048. Vincent Vesce, Forest Hills, L. I., N. Y., to Harmon Color Works, Brooklyn, N. Y.

Method drying wet pigment pastes and press cakes to fine, uniform, non-caking preparations. No. 2,138,049. Vincent C. Vesce, New York City, to Harmon Color Works, Brooklyn, N. Y.

Production stable titanium pigments; intimately associating with said pigments a water-insoluble, basic cadmium compound. No. 2,138,118. Gordon D. Patterson to du Pont, both of Wilmington, Del.

Production carbon black from hydrocarbon gases. No. 2,138,249. Wm. D. Wilcox, Pekin, Ill.

Preparation phthalocyanine pigments; reacting an aromatic orthodinitrile with a metalliferous reactant in presence of a liquid. No. 2,138,413. Frank S. Turek, Yonkers, N. Y., to Interchemical Corp., corp. of Ohio.

Resins, Plastics, etc.

Process curing alkyd resins comprising as resin ingredients dibasic aliphatic acid, dihydric alcohol, polyhydric alcohol. No. 2,136,253. Moyer M. Safford, Schenectady, N. Y., to General Electric Co., corp. of New York.

Preparation plastic composition, characterized by a crepe rubber appearance, from a heat-hardening resin; forming a solid gel from the resin and mechanically disrupting the gel without fusion. No. 2,136,329. Howard L. Bender, Bloomfield, N. J., to Bakelite Corp., New York City.

Vinyl resin coating composition. No. 2,136,378. Arthur K. Doolittle, So. Charleston, W. Va., to Union Carbide & Carbon Corp., New York City.

Preparation pigmented polymerized methyl methacrylate. No. 2,136,450. Barnard M. Marks, Arlington, N. J., to du Pont, Wilmington, Del.

Formation an oil-soluble xylenol-aldehyde varnish resin. No. 2,137,242. Carleton Ellis, Montclair, N. J., to Ellis-Foster Co., corp. of N. J.

Preserving adobe and like granular porous materials, impregnating surface, without production of a glossy surface, with a clear, colorless liquid consisting of a solution of a vinyl acetate resin in acetone and toluene; final product being water-proof and resistant to abrasion. No. 2,137,247. Frederick T. Martius, Omaha, Nebr.

Process polymerizing styrene; subjecting monomeric styrene to polymerizing conditions in presence of sulfur dioxide as catalyst. No. 2,137,393. Geo. L. Dorough, Holly Oak, and Geo. D. Graves, Bellefonte, Del., to du Pont, Wilmington, Del.

Process finishing a cellulosic textile by application of a resin; incorporating in finishing bath containing the resin an ammonium salt containing as an N substituent an aliphatic substituent of at least 12 carbon atoms. No. 2,137,465. Wm. J. Thackston, Haddon Heights, N. J., to Rohm & Haas Co., Phila., Pa.

Production infusible, weldable, phenolic molding powders. No. 2,137,568. Ludwig Cserny, Wiesbaden, Hessen-Nassau, Germany, to Resinous Products & Chemical Co., Phila., Pa.

Production soluble, oil acid-modified polyhydric alcohol-polybasic acid resins. No. 2,137,616. James Victor Hunn, Chicago, Ill., to Sherwin-Williams Co., Cleveland, O.

Method clarifying vinyl resins. No. 2,137,627. Marion C. Reed, Lakewood, O., to Carbide and Carbon Chemicals Corp., New York City.

Rubber

Rubber vulcanization process. No. 2,136,332. Albert M. Clifford, Stow, Ohio, to Wingfoot Corp., Wilmington, Del.

Process improving age-resisting characteristics of rubber, by treatment with a hydrogenated secondary naphthyl aryl amine. No. 2,136,335. Howard I. Cramer, Cuyahoga Falls, O., to Wingfoot Corp., Wilmington, Del.

A rubber hydrohalide of increased resistance to ageing, containing powdered aluminum. No. 2,136,342. James B. Holden, Akron, O., to Wingfoot Corp., Wilmington, Del.